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ERRATA

VOLUME XXV

page 21 line 50 delete '*Phytophthora* sp.' after '*Rhizoctonia* sp.'

26 27 for 'bunt' read 'bent'

39 25 for 'mycelium' read 'mycetin'

42 20 for 'the latter' read 'this'

56 40 for 'Kock' read 'Koch'

58 30 for 'Posnette (A. E.)' read 'Posnette (A. F.)'

60 32 for 'Saville (D. B. O.)' read 'Savile (D. B. O.)'

64 20 for '*Triticum*' read '*Agropyron*'

21 for '*coerulea*' read '*caerulea*'

121 40 for '444' read '443'

131 15 for 'puratized L.N.' read 'preventol G.D.'

16 for 'preventol G.D.' read 'puratized L.N.'

156 35, 36 for '*Ammophila avenaria*' read '*Ammophila arenaria*' for '*S. avenaria*' read '*S. arenariae*'

52 for '*E.*' read '*Elymus*'

157 1 for '*coerulea*' read '*caerulea*'

166 29 for '1942' read '1943'

184 48 for '*Medd.*' read '*Meld.*'

185 24 for '*H. macrospora*' read '*M. macrospora*'

188 17 insert after 'with salt-free' 'but did so slowly from concentrated'

208 48 for 'Fang T. C.' read 'Fang C. T.'

231 23 for 'blast' read 'bast'

240 8 for 'gelactose, manumose' read 'galactose, mannose'

248 27 for '332–335, 1922' read '333–335, 1929'

263 18 for 'calico' read 'celery calico [cucumber mosaic]'

279 51 for '*pardoxa*' read '*paradoxa*'

280 12 for '*cespitosa*' read '*caespitosa*'

341 49 for '*Panogrolaimus*' read '*Panagrolaimus*'

346 12 for '*lolicola*' read '*loliicola*'

373 6 for '*Clinocodium*' read '*Clinoconidium*'

454 49 for '(*Dothidella cymadothea*] *trifolii*' read '(*Dothidella* [*Cymadothea*] *trifolii*)'

488 48 for 'ccxxii' read 'xxxii'

524 50 for 'xxvi' read 'xxv'

556 1 for 'E. W. Lindstrum' read 'E. W. Lindstrom'

583 18 for '505' read '45'

589 39 for 'McFarland (W. H.)' read 'McFarland (W. A.)'

Additions and Corrections

to the List of Common Names of Virus diseases used in the Review of Applied Mycology (Vol. XXIV, part 13).

page 515 line — insert 'Wheat virus 2 (green mosaic) McKinney 1937' as a synonym under '*Agropyron* green mosaic virus. McKinney 1944.'

516 — insert 'Bean mosaic virus, 'new strain'. Dean & Hungerford 1946.' under 'Bean mosaic virus, 'new strain'. Richards & Burkholder 1943.'

520 — 18 for '*magninerva*' read '*magnivena*'

523 — insert before 'Euonymus Variegation' the following new entry:
'Elm Phloem Necrosis R.U. Swingle, *Phytopathology*, xxviii, 757, 1938; *U.S. Dept. Agr. Circ.* 640, 1, 1942; D. M. McLean, *Phytopathology*, xxxiv, 818, 1944; *P.D.R.S.*, 150, 482.
Elm phloem necrosis virus Swingle 1938.'

524 — insert after '*Humulus* virus 3. Smith *Tb.*' the following entry:
'Hop Mosaic Smith *Tb.* 193.
Hop mosaic virus Salmon 1923.
Hop false nettlehead virus Duffield 1925 fide K. M. Smith.
Humulus virus 1. K. M. Smith.'

24 delete '*Chlorogenus humuli* Holmes *Hb.*'
insert '*Chlorogenus humuli* Holmes *Hb*' under '? Hop Kräuselkrankheit or curl disease [virus].'

526 — 32 for 'McKinney, *J. Wash. Acad. Sci.*, xxxiv, 327–8, 1944.' read 'Grebennikov, *Trans. of conference on plant virus diseases, Moscow, 1940*, 107, 1941.'

530 — 27 for 'Kräuselkrankheit' read 'Blattrollkrankheit'
insert before 'Potato Mottle' the following entry:
'Potato Marginal Leaf Roll Quanjer, *Rept. Intern. Conf. Phytopath. & Econ. Entom., Holland*, 1923, 25, 1923.
Potato marginal leaf roll virus Quanjer, 1923.'

45 delete 'Potato common mosaic virus. Quanjer, 1923.'

531 — 10 for 'Quanjer fide Smith *Tb.*' read 'Quanjer fide Quanjer 1931.'

11 delete 'Potato top necrosis virus Quanjer, 1931.'

12 delete 'Potato acronecrosis virus Quanjer, 1931.'

39 insert 'may be' between 'Necrosis' and 'caused'
delete '& Potato virus A'

531 — insert under 'Potato virus B. Bawden in Smith 1933, Bawden, 1936.'
'Potato top-necrosis virus Quanjer 1931 fide Quanjer *in litt.*
Potato acronecrosis virus Quanjer 1931 fide Quanjer *in litt.*'

532 — 4 delete 'Stipple streak virus. Atanasoff 1922 fide Smith *Tb.*'

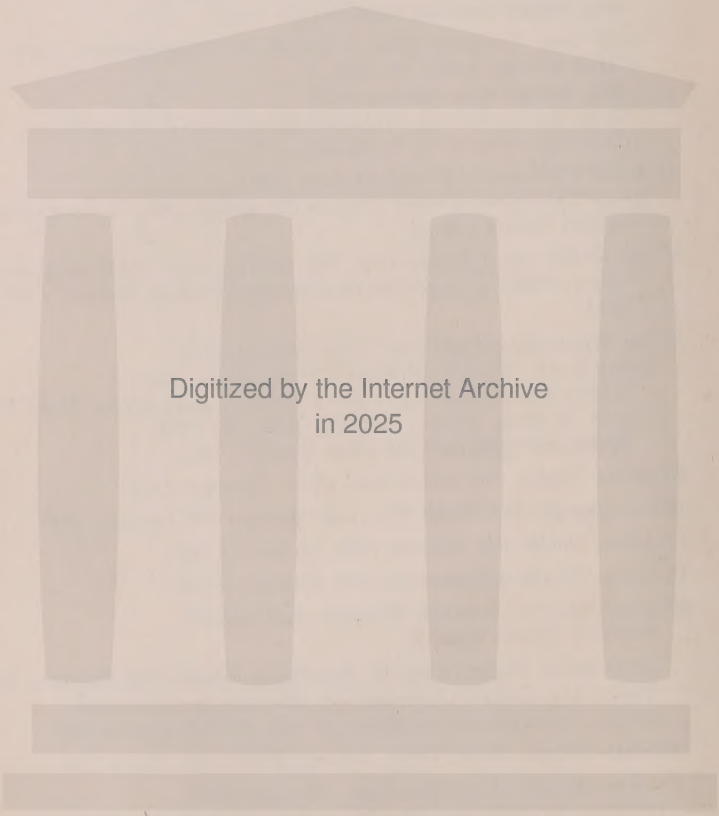
8 delete 'Acropetal necrosis virus. Quanjer 1931.'
insert under '*Solanum* virus 2 (var.) Smith & Dennis 1940.'
'Stipple-streak virus. Atanasoff 1922 fide Quanjer *in litt.*
Acropetal necrosis virus. Quanjer 1931 fide Quanjer *in litt.*
Necrose das Nervuras. Nobrega and Silberschmidt 1944.'

25 insert 'Martin 1922; Folsom, *Bull. Maine agric. Exp. Sta.* 312, 1923' after '111.'

26 for 'Goss 1930' read 'Folsom 1923'

27 for 'Folsom 1923' read 'Schultz and Folsom 1923'

28 delete 'Potato marginal leaf roll. Quanjer 1923, Fernow 1923.'
insert 'Potato common mosaic virus Quanjer 1923 fide Quanjer *in litt.*' as a synonym under 'Potato virus A. Murphy & McKay 1932.'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page 533 line 20 delete 'New York potato yellow dwarf virus. Black 1941.'

538 28 for 'McKinney 1929' read 'K. M. Smith 1937'

543 35 for 'xxiv' read 'xxxiv'

45 delete 'Wheat virus 2 (green mosaic) McKinney 1937.'

544 6 for *galbanum* read *galbinum*

14 for 'McKinney, *J. Wash. Acad. Sci.*, xxiv, 327, 1944' read 'Zazhurilo & Sitnikova, *C.R. Acad. Sci. U.S.S.R., N.S.*, xxv, 9, 798, 1939'

INDEX

page 544 column 1 line 36 add '(str.)' after 'Potato virus Y'

2 53 for '*magninerva*' read '*magnivena*'

547 1 insert before 'Erigeron yellows virus' the new entry: '**Elm phloem necrosis virus** 523'.

549 2 43 delete 'New York potato yellow dwarf virus, see Potato yellow dwarf virus'.

551 1 2 add '(str.)' after 'Potato virus X'

1 7 for 'X' read 'A'

1 16 for 'Kräuselkrankheit' read 'Blattrollkrankheit'

1 24 for 'Potato marginal leaf roll, see Potato spindle tuber virus.' read '**Potato marginal leaf roll virus,** 530.'

553 1 30 add '(str.)' after 'Potato virus Y'

555 2 49–50 for 'Wheat mosaic virus (str.)' read '*Agropyron* mosaic virus (str.)'

IMPERIAL MYCOLOGICAL INSTITUTE

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KEMP (H. K.) & BEARE (J. A.). **Lime-induced chlorosis of fruit trees.**—*J. Dep. Agric. S. Aust.*, xlviii, 12, pp. 526–529, 3 figs., 1945.

Lime-induced chlorosis of fruit trees occurs in many parts of South Australia in the lower rainfall areas. Experimental evidence showed that the condition was due to lack of iron in the trees, the high alkalinity of the soil rendering the element unavailable. Solid injections of organic iron salts just before bud-burst corrected the disorder for one season. Applications of ferrous sulphate to the soil by the 'crowbar hole' method, ½ lb. being placed in each of eight holes round each tree, shortly before bud-burst, in 1941 gave excellent results on apricots at Berri and pears at Renmark. In experiments at Berri in 1940, irrigation by a check-bank system to induce leaching gave a gradual permanent improvement in at least one instance.

BENNETT (S. H.), KEARNS (H. G. H.), & MARSH (R. W.). **A field trial on the combined control of codling moth and brown rot of Apples.**—*Rep. agric. hort. Res. Sta. Bristol, 1944*, pp. 157–161, [1945].

Cordon apple trees of the Cox's Orange Pippin variety given the normal routine lime-sulphur washes up to petal-fall stage and bearing a clean, moderately heavy crop of apples, were sprayed on 30th June, 1944, at the rate of 75 gals. per 25 trees with bouisol 4 pt., grade G oil emulsion 1 gal., and lead arsenate 3 lb.; or bouisol 4 pt., grade G oil emulsion 1 gal., and D.D.T. [dichlorodiphenyltrichlorethane: *R.A.M.*, xxiv, p. 328] 1 lb.; or fermate 2 lb., grade G oil emulsion 1 gal., and D.D.T. 1 lb., water in each case being added to make 100 gals. In October, the treated trees showed respectively 2·05±0·52, 2·15±0·73, 2·20±0·69 per cent. fruit infection with brown rot (*Sclerotinia fructigena*) [ibid., xxii, p. 29], as compared with 10 per cent. in the controls. Codling moth (*Cydia pomonella*) infestation was so slight that the results with regard to this part were without significance. The washes containing bouisol caused serious defoliation and russeting, while the fermate wash was not phytocidal, but left a tenacious, disfiguring deposit.

PIENIAZEK (S. A.). **Pre-storage carbon dioxide treatments for control of Apple scald.**—*Plant Physiol.*, xx, 2, pp. 313–314, 1945.

In an experiment at the Rhode Island Agricultural Experiment Station the control of apple scald [*R.A.M.*, xxi, p. 457] was attempted by passing a slow stream of air containing 30 or 60 per cent. carbon dioxide through 5-gal. containers filled with fruit for 3, 6, and 10 days, respectively. After treatment, the fruits, which had been picked on 1st and 21st September, 1944, were stored together at 32° F. and on 28th January, 1945, were transferred to a room at 65° to 70°. Fruit picked on the former date and treated immediately with 30 and 60 per cent. carbon dioxide, respectively, gave 100 per cent. control for the 3-, 6-, and 10-day treatments, whereas the untreated showed 78 per cent. scald. Apples treated after a month of storage had from 6 to 24 per cent. scald. Untreated fruit picked on 21st September had 50 per cent. scald and immediate and delayed treatments gave good control,

with scald ranging from 0 to 20 per cent. Similar treatment at room temperatures gave erratic and inconclusive results.

ATKINSON (J. D.). **Manganese deficiency of Peach trees.**—*Orchard. N.Z.*, xxvii, 2, p. 8, 1 fig., 1944.

In the Teviot area of Central Otago, New Zealand, peach trees often develop foliage mottling, followed by general chlorosis and partial defoliation. The affected trees become unthrifty, and the yields are reduced.

In experiments carried out with J. Hume, diseased peaches were sprayed with magnesium sulphate, zinc sulphate, and manganese sulphate, each at 3 lb. per 100 gals., plus 2 lb. hydrated lime. The manganese-treated trees showed marked improvement in 21 days and in 35 days were comparable to the best in the block [cf. *R.A.M.*, xxii, p. 252]. The magnesium and zinc treatments had no effect. The manganese caused no injury to fruit or foliage, but superficial residues gave the fruit a blemished appearance.

SMITH (C. O.). **Inoculations of the evergreen species of Prunus (laurocerasus) with Tranzschelia pruni-spinosae.**—*Phytopathology*, xxxv, 7, pp. 572–574, 1 fig., 1945.

Inoculations at the Citrus Experiment Station, Riverside, California, with uredospores of Dunegan's form *discolor* of *Tranzschelia* [*Puccinia*] *pruni-spinosae* [*R.A.M.*, xvii, p. 756] from peach and *Prunus pumila* on five evergreen species of *Prunus* under humid conditions were successful only on *P. caroliniana* and *P. ilicifolia* and its var. *integrifolia*. On the former species, the definite, circular, often coalescent spots, 1 to 5 mm. in diameter, were dark brown at the centre with a surrounding zone of greenish-yellow, and bore a few uredospores of the rust. The infected tissues collapsed and soon broke away from the healthy ones, giving a shot-hole or ragged appearance to the leaf. Similar effects were produced on the latter species and its variety, but the lesions did not exceed 3 mm. in diameter and there was less shot-hole than on *P. caroliniana*. It would appear that *Puccinia pruni-spinosae* is unable to perpetuate itself on the evergreen species of *Prunus*, the uredospores for the infection of which proceed from some more susceptible host. *P. ilicifolia* has not yet been observed to show natural infection by *Puccinia pruni-spinosae* in California [ibid., xviii, p. 745].

MARSH (R. W.) & DICKINSON (D.). **The control of Black Currant leaf spot by dithiocarbamate sprays and the effects of spray residues on the canned fruit.**—*Rep. agric. hort. Res. Sta. Bristol, 1944*, pp. 150–157, 1 graph, [1945].

On 6th July, 1944, 15 days before cropping, Baldwin black currant bushes were sprayed against *Pseudopeziza ribis* [*R.A.M.*, xxiii, pp. 327, 449] with fermate containing 60 per cent. ferric dimethyl dithiocarbamate with a spreader at 2 lb. per 100 gals. water, approximately 45 gals. being used on 56 bushes, while other rows were treated with 2 lb. fermate mixed with 1 pint ester salts in 100 gals. water, 40 gals. spray being used per 56 bushes. Some of the bushes remained untreated. On 27th July, the treated and untreated bushes were given a post-cropping application of Bordeaux mixture (4–10–100), copper sebacate spray (4 lb. sebacate made into a paste with ½ lb. agral L with a little water and diluted to make 100 gals. spray), or copper sebacate dust made by grinding together 4 lb. sebacate, 3 lb. silica, and 3 lb. gypsum. The quantities of material used were 35 to 40 gals. of spray or 5 lb. dust per 56 bushes.

The results obtained decisively demonstrated the value of fermate in the control of leaf spot, percentage foliage retention for the plots with a pre-crop spray and

then the three post-crop treatments and no such treatment being 70 and 81, 72 and 76, 66 and 76, and 66 and 73, respectively, and the corresponding figures for plots given no post-crop spray 57 and 66, 46 and 56, 34 and 46, and 24 and 21, respectively. The results also emphasized the greater effectiveness of the pre-cropping spray as against post-cropping treatments. The single application of fermate in early July with no subsequent treatment maintained until early October a higher level of control than was given by any post-cropping treatment. The supplementary post-cropping applications became of advantage only at the end of the season. Where no pre-cropping spray was applied, the value of the post-cropping treatments from mid-August onwards was, in descending order, Bordeaux mixture, sebacate spray, and sebacate dust. By early October, the plots given only the post-crop spray with Bordeaux mixture showed about the same amount of defoliation as those given only the pre-cropping treatment. Throughout July, August, and September, the pre-crop spray maintained better control than the post-crop Bordeaux treatment.

Storage trials with canned fruit bearing the fermate spray residue showed that the amount present produced no staining of the can and no discoloration of the contents. Preliminary tests indicated that this material, however, promotes the breakdown of vitamin C and interferes with the estimation of the vitamin.

Bremer (H.) & İşmen (H.). **How do the causal organisms of fruit rot get into the interior of the Figs?**—*Zir. Derg.*, iv, 44–45, pp. 109 112, 1943. [Turkish, with English summary. Received September, 1945.]

In order to solve the controversial problem of the mode of entry of fig-spoilage organisms [*R.A.M.*, xx, p. 483] into the interior of the fruits, Davey and Smith's experiments on uncaprified figs [ibid., xiii, p. 41] were repeated on caprified ones. The results indicated that a proportion of the organisms, which at first comprise largely bacteria, later *Fusarium* spp., and in the final stages *Aspergillus* spp. and yeasts, are introduced by insects, notably *Blastophaga grossorum*, while the remainder penetrate directly through the open 'eye'.

Thorold (C. A.). **Reported control of Panama disease.**—*Proc. agric. Soc. Trin. Tob.*, xlv, 1, pp. 39, 41, 1945.

Commenting on a recent article [by Scarseth: *R.A.M.*, xxiv, p. 198] on the control of banana Panama disease (*Fusarium* [*oxysporum* var.] *cubense*), the author states that experience in Trinidad and elsewhere confirms the opinion that the disease is worse on light acid soils than on heavier alkaline ones. The contention that the use of heavy applications of lime, with bulky organic matter, improves the condition of land abandoned as a result of infection is not new, F. E. V. Smith having reported the results of experiments along these lines in Jamaica in 1932. As the fungus has been found in the soil to a depth of at least 24 in., the lime should, naturally, be turned in deeply. It is certain that bananas benefit directly from improved soil conditions induced by the addition of organic matter, while there is likely to be also an indirect benefit brought about by a reduction of the fungus through the antagonism of other soil organisms.

Chowdhury (S.). **A leaf spot of Carica papaya caused by a new species of Phyllosticta.**—*Indian J. agric. Sci.*, xiv, 6, pp. 395–398, 1 col. pl., 1 fig., 1944.

In 1940, papaw (*Carica papaya*) plants in the vicinity of Haflong, Assam, developed a very serious leaf spot due to a species of *Phyllosticta*. The disease has been present ever since, and annually causes considerable damage.

The spots, which are found only on the leaves, vary considerably in size, some being small and rounded, 1 by 1 or $\frac{3}{4}$ mm., while others are irregular, oval, or

elongated, 3 to 15 by 2 to 11 mm. Almost white in the centre, they are often bounded by a yellowish or brownish margin which merges into the normal green of the leaf. The central portion of the spots is thin and papery, and finally it becomes brittle and drops out. When numerous spots are present, the leaf withers and falls.

Inoculations of healthy *C. papaya* plants in the laboratory, by spraying with a spore suspension of the fungus or placing mycelium and crushed pycnidia from a culture on unwounded leaf surfaces, gave 100 per cent. positive results (52 plants), while in outdoor tests, 217 inoculations were carried out by the latter method, with 97 per cent. successful results. All the controls remained healthy.

The organism is characterized by subepidermal, later erumpent, globose to subglobose, dark brown to black pycnidia, 80 to 115 by 60 to 95 μ, usually provided with distinct ostioles. The hyaline to subhyaline, straight to rarely slightly curved pycnospores are rounded at both ends and 5 to 10 by 2·5 to 3 μ. In culture on oat agar and *C. papaya* leaf juice agar the pycnidia measured 90 to 127 by 67 to 107 μ.

As the spore measurements are outside the probable range for the only two species of *P.* so far recorded on this host, *P. papayae* and *P. caricae-papayae*, the organism is regarded as a new species, and is named *P. sulata* Chowdhury n.sp.

The available evidence indicated that the parasite perpetuates itself in plant débris, and is disseminated by wind. The disease appears every year at the end of September when, though rainfall is scanty, there is heavy dew; this helps the pycnidia to burst, liberating the pycnospores and allowing them to germinate. The disease can be controlled by systematically collecting and burning affected leaves lying on the ground, and can be prevented (as was demonstrated experimentally) by spraying the plants with 1 per cent. Bordeaux mixture. Three applications should be made, at the end of August, on 15th September, and 15th October.

Leiserson (L.), Bost (R. W.), & Cameron (F. K.). **The importance of molecular structure in wetting agents.**—*J. Elisha Mitchell sci. Soc.*, lxi, 1–2, pp. 1–7, 1945.

A method of determining the rate of wetting in wetting agents, devised by Seyferth and Morgan (*Amer. Dyest. Reptr*, xxvii, p. 525, 1938), in which the rate at which a standard canvas disk sinks through the solution is observed, the observations according with the equation $t^n = kc$, where t is the sinking-time for a given distance, c the concentration, and n and k are constants, was applied to a number of commercial surface-active preparations. The [tabulated] results showed that of the 22 wetting agents tested, the three most efficient were aerosol OT [*R.A.M.*, xxii, p. 171] dry, santomerse [ibid., xxi, p. 111] D, and tergitol 7, while the two least efficient were igepon T gel and 85 per cent. Turkey red oil.

When various compounds were synthesized, it was found that sodium β-(amylonaphthoyl), conforming to a certain formula is very active and is an excellent wetting agent, but is precipitated by acids; a solution containing 0·8 gm. per l. sinks a canvas disk in 30 seconds. A solution containing 1 gm. iso-octyl β naphthol, 4 gm. sodium hydroxide, and 50 c.c. alcohol per l. sinks a canvas disk almost instantaneously. Observations on these substances and a condensation product confirmed the view that the presence of hydrophobic with hydrophilic groupings in a molecule makes for wetting activity. The presence of these groupings is not in itself a guarantee of effectiveness, but there must be a suitable arrangement of groupings, perhaps involving a balancing of internal stresses. In other words, the molecular structure is the dominant factor in determining effectiveness in a wetting agent.

Gäumann (E.). **Über Seuchenzüge bei pflanzlichen Infektionskrankheiten.** [On progressive epidemics in infectious plant diseases.]—*Experientia*, i, 5, pp. 153–157, 1 graph, 1 map, 1945. [English summary.]

The initiation of progressive epidemics in the plant world is governed by factors similar to those operating in the case of human diseases, the fulfilment of a series of conditions, notably the following, being demanded: (1) on the part of the host large populations of susceptible individuals, (2) on the part of the pathogen the existence of a high epidemiological potential, and (3) on the part of the environment optimal weather conditions for the development of the causal organism. The interplay of these factor-complexes is illustrated by the histories of white pine blister rust (*Cronartium ribicola*) and vine mildew (*Uncinula necator*), an interesting account of which is given.

Limasset (P.). **Principes de pathologie végétale. Notions sur les principales maladies parasitaires des plantes cultivées.** [The principles of plant pathology. Ideas on the chief parasitic diseases of cultivated plants.]—147 pp., 51 figs., Paris, Dunod, Éditeur, 1945.

In this book, intended chiefly for beginners, the author, after an introductory section dealing with parasitism and immunity and reviewing the history of plant pathology (pp. 1–16), devotes a long chapter (pp. 17–95) to plant mycoses and their control. Other chapters deal with bacterial diseases (pp. 96–106), virus diseases (pp. 107–126), parasitic phanerogams (pp. 127–130), and plant-pathological technique (pp. 131–136). There is a brief note on botanical classification, and a short but useful bibliography.

Heim (R.). **Les problèmes et les méthodes de la mycologie aux Colonies.** [Mycological problems and methods in the Colonies.]—*Conf. Off. Rech. sci. colon.*, pp. 133–158, 1943. [Received September, 1945.]

In this paper, read on 5th July, 1943, the author discusses the plant disease situation in the French colonies (where losses amounting to Fr. 1,000,000,000 per annum are caused), the training of phytopathologists and the organization of a colonial phytopathological service, based on a centre in France with documentation bureaux on the lines of the British Imperial Institutes and Bureaux.

Incidentally, it is stated that Panama disease of bananas (*Fusarium* [*oxysporum* var. *cubense*]) was observed for the first time in French Guinea in 1939.

Ajello (L.). **A simple method for preparing Corn meal agar.**—*Mycologia*, xxxvii, 5, pp. 636–637, 1945.

The author describes a simplified and quicker method of preparing maize meal agar using a 'Silex' [percolator] type coffee-pot fitted with a 'Cory' glass filter rod to extract the maize meal before adding the agar.

Talbot (P. H. B.). **A modification of slide-culture technique.**—*Nature, Lond.*, clvi, 3961, pp. 391–392, 1945.

A simple method of making slide-cultures for the study of moulds, devised by the author and M. C. White, is described. Melted nutrient agar is allowed to cool down to between 40° and 45° C., inoculated heavily with spores, and a drop transferred to a flamed slide with a platinum loop and covered with a flamed coverslip, the drop occupying a circle of about half the diameter of the coverslip. On inoculation in a moist Petri dish, the mycelium quickly spreads through the agar, and hyphae and sporophores develop in the air-space under the coverslip. Shear's mounting fluid may be introduced under the coverslip and the whole ringed with a cement, if desired.

TINT (H.). **An apparatus for the growth of plants under controlled temperature levels.** *Phytopathology*, xxxv, 7, pp. 511–516, 1 fig., 1 diag., 1 graph, 1945.

A description is given of an apparatus consisting of a rectangular, insulated chamber, divided into compartments and furnished with heating and refrigerating units, one at each end, which permits the investigation of plant development simultaneously at several temperature levels [see below, p. 19]. The temperature fluctuations within their respective levels in the individual chambers simulate the normal diurnal range in the field under the influence of varying degrees of insulation. The cost of the materials for the apparatus was approximately $25.00 and the various installation expenses totalled less than $45.00.

LAPAGE (G.). **Two new antibiotics.** *Nature, Lond.*, clvi, 3961, pp. 398–399, 1945.

After drawing attention to the existing need for an antiseptic or antibiotic that will effectively control Gram-negative micro-organisms, the author briefly discusses investigations recently carried out by various workers on streptomycin [*R.A.M.*, xxiv, p. 426] and streptothricin [ibid., xxiv, p. 463]. Both substances urgently require further clinical study.

RAPER (K. B.) & ALEXANDER (DOROTHY F.). **Penicillin : V. Mycological aspects of penicillin production.** *J. Elisha Mitchell sci. Soc.*, lxi, 1-2, pp. 74–113, 9 figs., 5 graphs, 1945.

A two year study of natural variation and penicillin production in four different members of the *Penicillium notatum-chrysogenum* group used for the commercial production of penicillin, i.e., *P. notatum* Westling, the original Fleming isolate, and strains developed from it, including NRRL 1249. B 21, widely used for the production of penicillin in surface culture, *P. notatum*, NRRL 832, generally used for penicillin production in submerged culture, *P. notatum*, NRRL 1950, and strains from it that produce high yields in surface culture, and *P. chrysogenum* Thom, NRRL 195, and strains from it, including NRRL 1951. B 25, used for penicillin production in surface and submerged culture, gave the following results.

In variants of the Fleming culture characterized by progressively reduced spore production and decreased exudate formation, up to a certain level, represented by such strains as NRRL 1249. B 21, reduced sporulation is accompanied by an increased capacity to produce penicillin in surface culture. Beyond this level of sporulation, production declines as spore formation is further reduced. White, non-sporulating strains show low yields. *P. notatum*, NRRL 832, is relatively stable, but some less productive variants were isolated. The stock culture of *P. notatum*, NRRL 1950, is quite stable in ordinary laboratory culture, but an ultra-violet induced mutation produced by Dr. G. W. Beadle and his associates is capable of producing substantially increased yields in surface culture. Very light-sporing variants produce low yields. *P. chrysogenum*, NRRL 1951, is most unstable, and substrains capable of producing substantially increased yields in surface and submerged culture were isolated. NRRL 1951. B 25, representative of the most productive type, also gave very light-sporing substrains with reduced yields.

Methods for maintaining cultures in the condition of highest production of penicillin are described.

BURKHOLDER (P. R.) & SINNOTT (E. W.). **Morphogenesis of fungus colonies in submerged shaken cultures.** *Amer. J. Bot.*, xxxii, 7, pp. 424–431, 2 figs., 1945.

This paper describes the effect of environmental influences on the morphology of colonies of various fungi, and especially of *Penicillium notatum*, developed from spore germination to large colonies in shaken solutions of three kinds of nutrients. While undisturbed cultures formed surface mats, agitated cultures resulted in discrete, globose, usually prosenchymatous masses which commonly possess charac-

teristic metabolism, colour, texture, and surface features. Differences in the composition of the medium reacted noticeably on the rate of growth, texture, and surface features of the colonies, and alternating zones of different textures resulted from alternating changes of temperature and intermittent shakings. Delayed shaking gave rise to colonies of irregular shape. By the use of shaken liquid cultures three types of reaction can be distinguished: (1) reactions to unilateral orientating factors (e.g., gravity, unilateral light, and chemical gradients); (2) reactions to general or unorientated factors (temperature, chemical substances, and quality of light); and (3) reactions to factors in the internal environment alone (such as hormones and enzymes). The specificity of the reaction of each type is dependent upon the genetic constitution of the organism.

Carpenter (C. W.), Weller (D. M.), & Martin (J. P.). **Studies with Penicillium notatum Westling in Hawaii.**—*Hawaii. Plant. Rec.*, xlix, 1, pp. 1–23, 13 figs., 1 graph, 1945.

After a brief review of the discovery, properties, and production of penicillin and its application to medicine, the authors describe studies carried out in Hawaii (where the prevailing temperature is highly conducive to the growth of *Penicillium notatum*) in which methods were devised for preparing inoculated surgical gauze dressings. References are made to topical penicillin therapy and various clinical cases.

Carpenter (C. W.). **Antibacterial properties of yeasts, Fusarium sp., Onion and Garlic.**—*Hawaii. Plant. Rec.*, xlix, 1, pp. 41–67, 9 figs., 1945.

A full account is given of studies carried out in Hawaii in the course of which the penicillin-sensitive *Staphylococcus aureus* and the penicillin-resistant, pus-forming bacteria *Pseudomonas aeruginosa* and *Bacillus* [*Bacterium*] *coli* were inhibited *in vitro* by *Torulopsis utilis*, and its vars. *thermophila* and *major*, and, to a less extent, by certain true yeasts, and by the juices and fumes of onion and garlic. Clinical cases are reported which indicate the anti-bacterial potency *in vivo* of *T. utilis* var. *major*. An undetermined variety of *Fusarium oxysporum* parasitic on *Opuntia megacantha* inhibited the growth *in vitro* of *S. aureus*, this being, apparently, the first record of the anti-bacterial potency of a *Fusarium* species against a human pathogen.

Rosenthal (L.). **Antagonistic action of a red mould pigment against bacteria of the typhoid-paratyphoid-dysentery group.** *Science*, N.S., cii, 2642, pp. 176–177, 1945.

The author records the production of a red pigment, antibiotic to typhoid, paratyphoid and dysentery (strains of Shiga and Flexner) bacilli, from a fungus isolated from human hair, which produced no fruiting bodies under the conditions tested, and so could not be identified.

Fitzgerald Moore (D.). **Torula utilis yeast or 'food' yeast.** *J. trop. Med.* (*Hyg.*), xlviii, 4, pp. 75–77, 1945.

The claims advanced for the application of the yeast *Torula* [*Torulopsis*] *utilis* to the solution of colonial food problems, as expounded in the booklet 'A Venture in Practical Nutrition' [*R.A.M.*, xxiii, p. 399], are critically examined and discussed on the basis of long personal experience in the investigation of a B-complex deficiency state in Africa. In the author's opinion the main uses of the yeast will lie in three directions, namely, (1) the treatment of B-deficiency states, (2) as an indirect source of human nutriment, in so far as it may prove a valuable adjunct to concentrated feeding of domestic animals, and (3) in times of famine. Here he believes its real advantages will end.

Limasset (P.). **La mosaïque chronique des Pommes de terre de la variété Royal Kidney.** [Chronic mosaic of Royal Kidney Potatoes.]—Reprinted from *C.R. Acad. Agric. Fr.*, 4 pp., 1943. [Received September, 1945.]

The author identifies the cause of mosaic disease of the Royal Kidney potatoes in France as a rather weak strain of virus X. Experimental evidence confirmed the view that it is possible to protect tobacco against virulent strains of the same virus by prior inoculation with an attenuated strain, though this is not at present a practicable method of control.

Foister (C. E.), Wilson (A. R.), & Boyd (A. E. W.). **Control of dry rot of seed Potatoes by dusting.**—*Nature, Lond.*, clvi, 3961, p. 394, 1945.

During the past three years, large-scale tests have been carried out in Scotland, under conditions approaching those obtaining in commercial practice, of the treatment of seed potatoes against dry rot (*Fusarium caeruleum*) [*R.A.M.*, xxiii, p. 38] by dusting with thymol, used at the rate of 12 oz. thymol made up to 10 lb. with kaolin, per ton of potatoes. A double application, i.e., on lifting and on riddling for despatch to England, gave excellent control, which, on the average, was slightly better than that given by the standard single treatment with an organo-mercury dip. Treated Catriona tubers despatched in December, Arran Pilot in December and March, and Doon Star in December and March, showed in April only 1, 1, 5, 4, and 3 per cent. infection, respectively, as against 17, 46, 19, 31, and 32 per cent. infection for the corresponding untreated lots. Some tubers showed, however, marked phytocidal effects from the treatment, though Doon Star was much less injured than Arran Pilot, and in some cases was almost undamaged. On the other hand, the treatment was found easy to carry out and inexpensive. It appears to have possibilities.

Jones (W.). **Pink rot disease of Potatoes in British Columbia.**—*Sci. Agric.*, xxv, 10, pp. 596–600, 2 pl., 1945.

This paper describes an investigation of potato pink rot disease (*Phytophthora erythroseptica*) [*R.A.M.*, xix, p. 40; xxiii, p. 56], a few tubers affected by which were obtained from the Okanagan district of British Columbia in 1943. In artificially inoculated tubers the most characteristic external symptom was a dark discoloration of the lenticels. The skin was dull and the eyes rather purple. The flesh on cutting was dirty white and became salmon-pink in half-an-hour. Warba, Epicure, Irish Cobbler, White Rose, Netted Gem, Burbank, Green Mountain, Columbia Russet, and Sequoia all proved equally susceptible to the pathogen. The disease was produced in mother- and young tubers from plants grown in soil inoculated with *P. erythroseptica*, accompanied by necrosis of the stolons, sprouts, and basal parts of the stems, and wilt of some leaves towards the end of the growing period. The optimum temperature for the growth of the fungus is approximately 24° C., the minimum between 4° and 8°, and the maximum below 34°. The optimum for disease development in the Burbank variety is approximately 25°. Crop rotation, destruction of diseased refuse, and careful grading before storage or marketing are recommended measures of control.

Teakle (L. J. H.). **Experiments with micro-elements for the growth of crops in Western Australia.**—*J. Dep. Agric. W. Aust.*, Ser. 2, xxii, 2, pp. 147–148, 1945.

Potatoes grown on swamp land near East Narrikup, Western Australia, made unsatisfactory growth, the first crop yielding 13 tons per acre, the next about half, and the third failed. Applications of managanese sulphate at the rate of 132 lb. per acre in 1944 and 28 lb. in 1945 secured yields of 8 and 5 tons and greatly exceeded the results obtained with Epsom salts [magnesium sulphate], borax, copper sulphate, or zinc sulphate [*R.A.M.*, xviii, p. 95; xxi, p. 92]. Manganese

deficiency is indicated by a bronzing or yellowing of the leaf, accompanied by unthrifty growth. It is recommended that potatoes showing unsatisfactory growth on swamp land should be treated with 28 to 56 lb. manganese sulphate per acre with the potato manure.

Stevenson (J. A.) & Imle (E. P.). **Periconia blight of Hevea.**—*Mycologia*, xxxvii, 5, pp. 576–581, 4 figs., 1945.

In December, 1943, a severe leaf-spotting of *Hevea spruceana* was observed at Turrialba, Costa Rica, and, after a long period of rain, the disease became epiphytotic and caused minor damage to *H. brasiliensis* seedlings. The same disease was observed earlier by W. J. Martin on *H. brasiliensis* in Mexico.

The leaf spots are circular to oval, at times rather elongated along the veins, but not vein-limited, appearing much the same on both surfaces. Primary lesions vary in diameter from 2 to 10 mm., but frequently coalesce, particularly on young leaves, so that the whole leaf surface may be covered, with the result that premature abscission may occur. The spots are brown at first, becoming ashen at the centre with a brown border, and on mature leaves they are often ringed by a chlorotic halo. Necrotic areas split irregularly and may even fall away. Petiole lesions are common and cause leaf abrasions or petiole breakage if severe. Sometimes the petiole lesions or leaf spots spread down to the leaf axils and cause sunken twig cankers or dieback of young, soft twigs.

The disease has been found also on *H. guianensis*, *H. benthamiana*, and on hybrids of *H. brasiliensis* × *H. spruceana*. *H. spruceana* clones selected for resistance to South American leaf blight (*Dothidella* [or *Melanopsammopsis*] *ulei*) [*R.A.M.*, xxiii, p. 455] are readily susceptible to the new pathogen when grown with thin shade. The available evidence indicates that the disease is not likely to become an important factor on *H. brasiliensis*, except when grown with *H. spruceana*.

A species of *Periconia* has been found constantly associated with the diseased areas and has relatively large, black conidiophores, 250 to 400 μ long, with a bulbous basal cell, 45 to 90 μ long, 24 to 30 μ in diameter at the base, 15 to 18 μ above, surrounded with a whorl of sporogenous cells at the base, these bearing globose, deep brown, strongly verrucose conidia. They have a short, clavate, apical cell, 25 to 45 μ in diameter, short catenulate, the terminal conidium only reaching extreme size. Very few species of *Periconia* have been reported as plant parasites and none hitherto on members of the Euphorbiaceae; all differ from the species on *Hevea* in having much smaller conidia and in other specifically morphological characters. It is considered, therefore, to be new and is named *P. heveae*.

Hewitt (E. J.). **Experiments in mineral nutrition. II. The visual symptoms of mineral deficiencies in crop plants grown in sand cultures. Progress Report, 1944.**—*Rep. agric. hort. Res. Sta. Bristol, 1944*, pp. 50–60, [1945].

Continuing his survey of the visual symptoms of mineral deficiencies in crop plants [*R.A.M.*, xxiii, p. 457] the author presents in tabular form the deficiency symptoms observed on 28 crops grown in controlled nutrient deficiency sand cultures.

Nicholas (D. J. D.) & Jones (J. O.). **The application of rapid chemical tests to plant tissues in the diagnosis of deficiencies of mineral nutrients. Progress report I.**—*Rep. agric. hort. Res. Sta. Bristol, 1944*, pp. 84–97, [1945].

Experiments [which are described and the results of which are tabulated] made with the tissue-test method of assessing the mineral status of plants, using fresh plant material with known deficiencies or grown with known nutrient treatment, showed that there was a fair degree of correlation between visual symptoms,

manurial treatment, and the tissue-test data. The tissue-test results invariably agreed with the severity of the deficiency symptoms. The evidence obtained suggests that the tissue-test will prove valuable for diagnostic purposes, though further work is necessary to solve certain problems.

CHOWDHURY (S.). **Rhizoctonia root-rot of Pan (Piper betle) in relation to manuring.** —*Indian J. agric. Sci.*, xiv, 6, pp. 391–394, 1944.

After stating that root rot (*Rhizoctonia* [*Corticium*] *solani*) of *Piper betle*, the only manure used for which is mustard oil-cake, is very serious in Assam, and causes heavy damage wherever it occurs [*R.A.M.*, xxiv, p. 248], the author describes experiments with different manures, which demonstrated that the percentage of deaths of *P. betle* plants from infection by *C. solani* is not affected by the nature of the fertilizer used. The figure was virtually the same in plots given oil-cake, sodium nitrate, ammonium sulphate singly, or sodium nitrate or ammonium sulphate in combinations with superphosphate and potassium sulphate. The yield of leaves, however, was slightly greater in the plots receiving oil-cake than in the remainder.

UPPAL (B. N.), VERMA (P. M.), & CAPOOR (S. P.). **A mosaic disease of Cardamom.**—*Curr. Sci.*, xiv, 8, pp. 208–209, 1945.

Cardamom (*Elettaria cardamomum*) mosaic [*R.A.M.*, xviii, p. 89; xxi, p. 464] occurs in Travancore, Mysore, and North Kanara. The first visible symptoms appear as a general chlorosis of the whole leaf, with thin, broken stripes of deep green tissue over the surface. These stripes follow the veins and run parallel to one another from the midrib to the leaf margin. When the disease is fully developed, the stripes are more or less evenly distributed. In nature, the plants are susceptible at all stages of growth. The affected clumps quickly deteriorate. Newly formed shoots from such clumps are small, and show gradual reduction in productivity, followed by death. Many clumps wither before beginning to yield.

Experimental evidence showed that the disease is not soil-borne, while all attempts at transmission by sap inoculation also gave negative results. Infection was, however, transmitted by *Pentalonia nigronervosa* in 21 to 46 days after transfer to healthy cardamoms in insect-proof glasshouses.

ZOGG (H.). **Die Herzfäule des Oelmohns und ihre Bekämpfung.** [Opium Poppy heart rot and its control.]—*Flugbl. landw. VersAnst. Zürich-Oerlikon* 14, 4 pp., 4 figs., 1944.

Opium poppies in Switzerland have of late years developed the characteristic symptoms of heart rot associated with boron deficiency [*R.A.M.*, xxiii, p. 189], including rolling of the leaves along the midrib and stunting or distortion of the heart, rapidly followed by a dark purple discoloration and decay involving the upper portions of the stem or the entire plant. Alternatively, flowering may proceed normally, but after the fall of the misshapen petals, either the young ovary will be found showing a blue tinge or at least the capsule, also partially discoloured, will be bent over to one side. At the same time the leaf axes and portions of the stem show a similar change of colour, the latter organs also frequently bearing blisters and cracks through which the darkening juice exudes. At this advanced stage of the disease the plants often collapse suddenly: the stem is hollow and the liquefied medulla flows out when the base is cut.

Preventive soil treatments with borax or boric acid at dosages of 20 and 12 kg. per ha., respectively, have given satisfactory results. Curative measures are ineffectual.

Carvajal (F.). **The relation between Vermicularia graminicola West. reported on Sugar Cane and Physalospora tucumanensis Speg.**—*Mycologia*, xxxvii, 5, pp. 637–638, 1945.

The writer considers Spegazzini's specimen of *Vermicularia graminicola* West. on sugar-cane leaves collected in the Argentine (*Rev. Fac. Agron., B. Aires*, ii, pp. 227–258, 1896) specific with *Physalospora tucumanensis* [*R.A.M.*, xxiii, p. 358] on the ground that the conidial and perithecial states found in the specimen are reasonably coincident with those of the red-rot fungus studied by him in Louisiana.

Hirschhorn (Elisa). **Algunos caracteres del 'carbón' de la Caña de Azúcar en la Argentina (Ustilago scitaminea Sydow).** [Some characters of the Sugar-Cane smut (*Ustilago scitaminea* Sydow) in Argentina.]—*Not. Mus. La Plata*, viii, pp. 23–39, 1 pl., 4 figs., 1943. [Received October, 1945.]

The available information concerning the geographical distribution of sugar-cane smut (*Ustilago scitaminea*) in Argentina, its relation to climatic and physiological factors, the varieties attacked, and the economic importance of the disease is summarized, and the morphological characters of 300 specimens (all except three from Tucumán) described and critically discussed. As already mentioned by G. L. Fawcett [*R.A.M.*, xxiv, p. 74], the author divides the material into six groups, of which No. 4, characterized by two types of chlamydospores (*a*) golden to greyish, globose, 11 μ in diameter, with a tenuous, conspicuously echinulate membrane, and (*b*) reddish, globose or irregular, 5 to 6 μ in diameter, with an almost smooth membrane, approximates most nearly to Mundkur's *U. scitaminea* var. *sacchari-officinarum*. The chlamydospores of the other groups are distinguished by the following features: (1) chestnut to greyish, globose or subglobose, 5·7 to 7·5 μ in diameter, with a somewhat verrucose membrane; (2) chestnut to golden or reddish, globose, subglobose, or elliptical, 4 to 7·5 μ in diameter, with a slightly echinulate membrane, 1·5 to 2 μ in thickness; (3) dark chestnut to nearly black, globose or irregularly polygonal, 5·5 to 9 μ in diameter, with an almost smooth or barely punctate membrane, 1 to 3 μ in thickness; (4) golden-reddish or nearly black, very lustrous, irregular, 5 to 7·5 μ in diameter, with a small or barely punctate membrane, 3 μ in thickness; (5) lemon-coloured, globose, 4 to 5 μ in diameter, with a tenuous, highly echinulate membrane. Group 1 is considered to agree with the type species. The germination of the chlamydospores of five groups is described and figured.

Cummins (G. B.). **Additions to the Uredinales of Peru.**—*Mycologia*, xxxvii, 5, pp. 609–618, 5 figs., 1945.

This list contains 49 species of Uredinales reported from Peru, including five new species and 24 not mentioned by Garcia Rada and Stevenson [*R.A.M.*, xxiii, p. 316].

Thirumalachar (M. J.). **Some noteworthy rusts. I.** *Mycologia*, xxxvii, 3, pp. 295–310, 21 figs., 1945.

Descriptions are given of six rusts found in Mysore, including a new genus, *Acervulopsora*. A study of the morphology of the spore forms and of the life-cycle of *Uromyces mucunae*, which is abundantly present on *Mucuna pruriens* in the vicinity of Bangalore, showed that the uredosori are hypophyllous, scattered over the whole surface of the leaves, while the uredospores are hyaline, with a densely echinulate exospore, and have four scattered germ-pores. The teleutosori which replace the uredosori are brownish-black. The teleutospores are chestnut-brown, with a blackish tinge, globose, and have an apical, indistinct germ pore. The

exospore presents numerous warts in longitudinal rows. The teleutospores germinate only after a period of rest, giving rise to amphigenous, subepidermal, flask-shaped pycnidia showing well-developed ostiolar hyphae. The uredospores readily germinated and induced secondary infection.

Hirschhorn (Elisa). **Las especies de Sorosporium de la flora argentina.** [The species of *Sorosporium* of the Argentinian flora.]—*Rev. Mus. La Plata*, N.S., iii, Secc. bot., pp. 335–354, 4 pl., 2 figs., 2 graphs, 1941. [English summary. Received October, 1945.]

This paper opens with a brief discussion of the generic characters of *Sorosporium*, the life-history of the type species, *S. saponariae*, and the economic importance in Argentina, notably of *S. reilianum* [*Sphacelotheca reiliana*] on maize and sorghum, and to a less extent of *Sorosporium paranensis* n.sp. on *Axonopus compressus*, a valuable forage crop of sandy or semi-sandy soils, and of *S. platensis* n.sp. on *Andropogon saccharoides*, *A. imperatoides*, and *A.* sp. Up to the time of writing, no statistical survey of the damage caused by *Sphacelotheca reiliana* in the Republic had been undertaken, but in 1936–7 the incidence of infection on maize in Entre Ríos, where the crop is extensively cultivated, was estimated at 10 to 15 per cent., while heavy losses are also periodically reported from the Pergamino district of Buenos Aires. Sorghum appears to sustain less injury than maize under comparable conditions. *Sorosporium paranensis* has been observed in Entre Ríos and Buenos Aires destroying the inflorescences and entirely preventing seed production in every plant of *Axonopus compressus* in plots covering 100 sq. m. Similar effects are produced on the above-mentioned *Andropogon* spp. by *S. platensis*.

The author then describes the results of her analysis of material supplied by the Spegazzini Botanical Institute and the Laboratory of the Faculty of Agronomy of the National University of La Plata, as well as by various specialists, which led to the establishment of three species new to science, two new to the Argentinian flora, three hosts not yet recorded as harbouring *Sphacelotheca reiliana* in the Republic (namely, sorghum, *Sorghum bicolor* var. *charisianum*, and *S. cafforum* var. *albo-fuscum*), a revised diagnosis of *Sorosporium antarcticum* Speg., and the provision of a key to the Argentinian species of *Sorosporium*.

The golden or orange chlamydospores of *S. paranensis* may be either circular, 6 to 10 μ in diameter, or ovate to slightly rhomboid, 15 to 11 by 6 to 7 μ, and are furnished with a faintly or barely echinulate membrane, 0·5 μ in thickness, while those of *S. platensis* are olivaceous, chestnut or golden, either globose or polygonal, 7 to 11 μ in diameter, or somewhat ovate, 9 to 11 by 6 to 7 μ, with a tenuous, slightly spinulate membrane.

O[rejuela] (C. G.). **A correction.**—*Mycologia*, xxxvii, 3, pp. 389–390, 1945.

In this note the author cites a passage accidentally omitted from his recent paper on the higher Ascomycetes in Columbia and Venezuela [*R.A.M.*, xxiv, p. 75].

Jamalainen (E. A.). **Über die Fusarien Finnlands. I, II, III.** [On the *Fusaria* of Finland.]—*Valt. Maatalousk. Julk.* 122, 26 pp., 5 figs., 1943; 123, 25 pp., 6 figs., 1943; 124, 24 pp., 8 figs., 1944. [Finnish summary.]

The author presents three lists, with brief historical and descriptive details, of the species of *Fusarium* found in Finland and pathogenic to crops and trees of the country: *F. nivale* [*Calonectria graminicola*] [*R.A.M.*, xxii, p. 471] mostly on winter rye; *F. sambucinum* mostly on *Picea excelsa* [*P. abies*] and potato tubers [ibid., xxiii, p. 476], *F. sambucinum* form 2 Wollenw. on a *P. abies* seedling; *F. culmorum* on grains of spring wheat and *F. graminearum* [*Gibberella zeae*] usually on oats, barley, and wheat; *F. poae* [ibid., xxii, p. 265], mostly on stems

of spring wheat in the south and the central part of northern Finland; *F. citriforme* n.sp., mostly on seed of various cereal crops (conidia somewhat piriform or rounded, mostly unicellular, occasionally 1- to 4-septate, measuring 9·6 by 6·1 μ, mostly 8 to 12 by 5·5 to 7 (6 to 14 by 3·6 to 9·4) μ; when 0- or 1-septate they are at first citriform, each end apiculate, occasionally globose or piriform; a few are ellipsoidal-fusiform, 0- to 2-septate, and 10 to 20 by 2·2 to 4·2 μ; when 3- to 4-septate, falcate, sharp at each end; when 3-septate measuring 23 to 30 by 2 to 4 μ); *F. sporotrichoides* on cereal crops [ibid., xx, p. 353], *Lolium perenne*, and red clover (*Trifolium pratense*); *F. avenaceum* on wheat (grain and stems), barley (grain), oats (one record only), and potatoes; *F. avenaceum* form 1 on *P. abies* and potatoes; *F. caeruleum* on potatoes; and *F. solani* on barley grain, *P. abies*, rhubarb leaves, and rotted potatoes; *F. merismoides* on potatoes with one record on *P. abies*; *F. anguioides* on rhubarb (one record); *F. scirpi* var. *acuminatum* on *Agrostis tenuis*, onions, *Crataegus coccinea*, barley ears, rye grain, tomato fruit, rotted potatoes, and ears of spring wheat; *F. bulbigenum* on cucumber fruit and barley grain; *F. oxysporum* var. *aurantiacum* [ibid., xxii, p. 58] on the neck of onions and on sugar beet; *F. redolens* [loc. cit.] on *Pinus sylvestris*; *F. arthrosporioides* on oats ears, beetroot, barley ears, *Picea abies*, winter rye ears, potato tubers, and the stems of spring wheat; and *F. detonianum* on oats, barley, winter wheat, and an ear of spring wheat (four single records only).

Moreau (F.) & Moreau (Mme). **Recherches sur les Saprolegniées.** [Studies on the Saprolegniales.]—*Ann. Sci. nat., Bot.*, Sér. 11, i, 2, pp. 221–358, 24 pl., 1 fig., 20 graphs, 1940. [Received September, 1945.]

The authors' exhaustive studies on seven members of the Saprolegniales, comprising four species of *Saprolegnia* and three of *Achyla*, fall into four chapters, dealing, respectively, with the culture, taxonomy, physiology, and cytology of the order [*R.A.M.*, xvii, p. 347]. A three-page bibliography is appended.

Mhatre (J. R.) & Mundkur (B. B.). **The Synchytria of India.**—*Lloydia*, viii, 2, pp. 131–138, 1945.

After a preliminary note on the genus *Synchytrium*, with special reference to its occurrence in India, the authors give technical descriptions based on the Indian collections of the 15 species now recorded from that country, including three new records and six which are considered to be new species. Mention may be made of *S. trichosanthidis* n.sp., *S. lagenariae* n.sp., and *S. piperi* n.sp. The first-named attacks the fruit and leaves of *Trichosanthes dioica*, a cucurbit of much importance as a vegetable locally; the affected fruits turn yellow and lose their flavour, with resultant loss in market value. The host surface is covered with white crust-like galls, 0·1 to 0·3 mm. in diameter. The smooth, spherical, olive- to dark brown resting spores, one or two in each cell, measure 64 to 95 μ. *S. lagenariae* produces dirty white, crust-like, light brown, sometimes cupulate galls, 0·2 to 0·4 mm. in diameter, on the leaves of *Lagenaria vulgaris*; the resting spores, one in each cell, are globose, smooth, lemon-yellow, thin-walled, 39 to 86 μ in diameter. *S. piperi* forms galls as minute, white dots on the leaves of *Piper betle*; the resting spores, one in each cell, are spherical, smooth, thin-walled, light brown, 30 to 38 μ in diameter.

Chodat (F.). **Emploi des rayons ultra-violets pour la classification des levures.** [Use of ultra-violet rays for the classification of yeasts.]—*Verh. schweiz. naturf. Ges.*, cxxiii, pp. 131–132, 1944.

Examined under ultra-violet light yeast (*Endomyces*, (?) *Hansenula*, *Torulopsis*, and *Mycoderma* spp.) colonies on beer wort agar assume either a pale to white or

dark to black coloration, while the presence of contaminants, invisible under white light, is revealed by a mosaic of alternating pale and dark zones. Lamps applicable for this purpose include Hanau or Philora HPW 120, provided with filters of Wood's glass, and Ulvir with a nickel oxide filter to eliminate the infrared rays.

Koch (L. W.). **The 1945 epidemic of blue mould of Tobacco in Ontario.**—*Lighter* (*Dep. Agric. Can.*), xv, 3, pp. 1–4, 1945.

Tobacco blue mould (*Peronospora tabacina*) first appeared in Canada in 1938 [*R.A.M.*, xx, p. 429], near Essex, Ontario, additional outbreaks occurring later in the same year near Harrow and Blenheim. All these localities are in the Old Tobacco Belt, and the available evidence indicated that the most probable source of infection was air-borne sporangia carried across Lake Erie from Pennsylvania, Ohio, and, perhaps, Massachusetts and Connecticut. In 1939, the disease reappeared in the same district, but only on two farms. There was no record of any infection in the next three years, but in 1943 one case was reported, and in 1944 another. Up to this time, all diseased seedlings had been carefully eradicated. In 1945, however, blue mould reappeared in epiphytotic form in the entire Old Tobacco Belt and finally attained a similar intensity throughout a great part of the New Tobacco Belt.

Though the mould in North America has been almost exclusively a seedling disease, damage did not cease on transplanting to the field. In certain areas of the New Belt, fields up to 10 acres in size showed a high percentage of plants with one or more leaves affected, particularly the lower ones.

All the evidence indicates that masses of sporangia carried by air currents from the tobacco-growing areas of the United States were the source of the 1945 epidemic. Initial infection occurred in Ontario over widespread areas in a period of a few days to a week. Growers also agreed that infection originated in the beds in one small area as a patch of yellowed or wilted plants which underwent little change for a week to ten days, after which the whole had suddenly become infected. These symptoms indicate infection by sporangia rather than oospores. Control measures with paradichlorobenzene in cotton-covered beds and fixed copper for the glass-covered were carried out, with variable but generally satisfactory results.

Gram (E.). **Tobaksavl. Mosaiksyge og andre virussygdomme paa Tobak.** [Tobacco cultivation. Mosaic disease and other virus diseases of Tobacco.]—*Vejl. Akad. tekn. Vidensk.* 3, pp. 1–7, 1 col. pl., 2 figs., 1943. [Received August, 1945.]

This is a popular note on the virus diseases affecting Danish tobacco crops, with special reference to the tobacco mosaic virus, an investigation of which by H. P. Hansen was in progress at the time of writing. The symptoms are briefly described and differentiated from the somewhat similar effects of various non-parasitic agencies. Control measures are indicated.

Limasset (P.). **Sur un effet de renforcement réciproque de l'action de deux virus dans une maladie complexe du Tabac et de la Tomate.** [On a mutually reinforcing effect of the action of two viruses in a complex disease of Tobacco and Tomato.]—Reprinted from *C.R. Acad. Agric. Fr.*, 3 pp., 1944.

In 1943, young shoots of a topped tobacco plant inoculated with tobacco mosaic virus, developed malformed leaves, referred to as 'pseudo-vrilles' or pseudotendrils, which were later found to be infected both by tobacco mosaic and cucumber virus 1 [cucumber mosaic virus]. The disease was transmitted by mechanical inoculation to tobacco and tomato.

Croxall (H. E.). **The effects of copper sprays on marketable yield and storage rots of outdoor Tomatoes.**—*Rep. agric. hort. Res. Sta. Bristol, 1944*, pp. 161–166, [1945].

In spraying trials against blight (*Phytophthora infestans*) and fruit rot (*Didymella lycopersici*), outdoor tomatoes of six different varieties were sprayed with copper oxychloride at intervals of one, two, and four weeks, and with copper sebacate at intervals of two and four weeks, in both cases over a total period of twelve weeks [cf. *R.A.M.*, xxiii, p. 462]. No blight occurred on any plot (including the controls) throughout the season. None of the treatments caused any appreciable damage. With the varieties Ailsa Craig and E.S. 1, the sprayed plots gave significantly higher yields than the unsprayed (15·83 and 16·00 tons per acre of total fruit picked for plants sprayed at four-weekly intervals with copper oxychloride, and 15·15 and 15·48 for those treated similarly with copper sebacate against 11·43 and 13·85 for the controls, respectively), probably owing to partial control of *D. lycopersici* in the former. During the ripening of green fruit in storage, considerable losses were sustained as a result of infection by *D. lycopersici* and, to a less extent, by *Botrytis* [? *cinerea*], but the losses were significantly less in the sprayed than in the unsprayed fruit, the greatest reduction being in the lots given 12 applications of copper oxychloride. It would seem that the possibility of devising a spray programme that would protect tomatoes in the field against *D. lycopersici* might be worth further investigation.

Jones (J. O.), Nicholas (D. J. D.), Wallace (T.), & Jefferiss (A.). **Experiments on the control of magnesium deficiency in glasshouse Tomatoes. Progress Report II.**—*Rep. agric. hort. Res. Sta. Bristol, 1944*, pp. 61–71, [1945].

Experiments on the control of magnesium deficiency in glasshouse tomatoes [*R.A.M.*, xxiii, p. 461], carried out at five centres in 1944, showed that base dressings of magnesium sulphate (30 per cent. MgO) at the rate of 6 cwt. per acre gave only partial control. To secure commercial control a rate of 10 cwt. was necessary, but dressings at rates higher than this were no more effective. Liquid dressings to the soil during the growing period at a total rate of 5 cwt. per acre were relatively ineffective. Complete control was, however, secured even in severe cases by three or four spray applications during the growing season, using total amounts of magnesium sulphate of only 1½ and 5 cwt. per acre, respectively. Chemical data from leaves in the mid-stem region indicated that a value of 0·5 per cent. MgO in dry matter is a 'threshold value' between sufficiency and deficiency.

Rayner (M[abel] C.). **Trees and toadstools.**—71 pp., 18 pl., London, Faber & Faber, 1945. 6*s.* 0*d.*

In this attractively produced book, the author describes in lucid and simple language some of the commonly known toadstool-producing fungi and their association, pathogenic, symbiotic, and antibiotic, with our common trees and shows how plants belonging to widely different groups are interrelated with each other and with the mechanism of life as a whole. The writer concludes by seeing the soil as itself like human society, with manifold vital activities carried on by its numerous living inhabitants, to which trees and toadstools belong.

Blake (M. A.) & Edgerton (L. J.). **Experiences with blight-resistant Chestnuts in New Jersey.**—*Bull. N. J. agric. Exp. Sta.* 717, 20 pp., 12 figs., 1945.

In this account of chestnut-growing in New Jersey in relation to blight [*Endothia parasitica*: *R.A.M.*, xxiii. p. 367], the authors describe the distinguishing characters of the four chief species and state that the Chinese chestnut (*Castanea mollissima*) appears to be the most promising of the resistant varieties. It is more resistant than either the Japanese chestnut (*C. crenata*) or the European (*C. sativa*), and the

nuts combine the large size of the European with the high quality of the native species (*C. dentata*). The Henry chinkapin variety (*C. henryi*), also native to China, has now been introduced, and is reported to be resistant. It may prove useful as a timber tree, and is under test in various places.

Hirt (R. R.) & Lowe (J. L.). **Polyporus versicolor on Asiatic Chestnut.**—*Phytopathology*, xxxv, 7, pp. 574–575, 1 fig., 1945.

In the autumn of 1944 an Asiatic chestnut [? *Castanea crenata* or *C. mollissima*] tree at the New York State College of Forestry was observed to bear the sporophores of *Polyporus* [*Polystictus*] *versicolor* on two branches, while the spongy heart rot typical of the fungus was present in the trunk and branch heartwood. These chestnuts have now begun to be put on sale in the United States, and their susceptibility to pathogenic fungi is therefore a matter of general concern to plant pathologists and tree specialists. *P. versicolor* is known to cause heartwood decay in living *Catalpa*, black cherry [*Prunus serotina*: *R.A.M.*, xxiii, p. 123], London plane (*Platanus acerifolia*) [ibid., xxiii, p. 83], apple, pear, and plum [ibid., xvi, p. 106], with consequent weakening and enhanced susceptibility to wind, snow, and ice damage.

Sarasola (A. A.). **Nuevas observaciones sobre la cancrosis de los Alamos.** [New observations on Poplar canker.]—*Rev. argent. Agron.*, xii, 2, pp. 115–119, 1 pl., 1945. [English summary.]

Continuing his studies on poplar canker in Argentina [*R.A.M.*, xxiii, p. 365], the writer records the detection of the pycnidial stage of the causal organism, *Septoria musiva* [ibid., xx, p. 386] in a number of fresh localities in the province of Buenos Aires. The Lombardy poplar (*Populus nigra italica*) was uniformly resistant to the disease under natural conditions, but other 'varieties', the hybrid Arnaldo Mussolini, for instance, sustained increasingly heavy damage after the second or third year. The severity of infection appears to be influenced by atmospheric humidity and soil height.

The perfect stage of the pathogen, *Mycosphaerella populorum* [loc. cit.] developed from pycnidia on *P. laurifolia* and Arnaldo Mussolini leaves collected in the autumn of 1943 and suspended during the following winter in wire baskets among infected branches at the Delta experimental farm. The dimensions of the perithecia, asci, and ascospores thus obtained differed appreciably from those given by Thompson, being 55·5 to 185 by 44·4 to 151·7, 33·3 to 88·8 by 7·4 to 16·6, and 11·1 to 20·3 by 3·7 to 7·4 μ, respectively. Monospore cultures of *M. populorum* on potato dextrose agar gave rise to the typical pycnidia and pycnospores of *S. musiva*, inoculations with which on Lombardy poplar, *P. laurifolia*, and Arnaldo Mussolini stems and branches produced characteristic cankers.

Loustalot (A. J.), Burrows (F. W.), Gilbert (S. G.), & Nason (A.). **Effect of copper and zinc deficiencies on photosynthetic activity of the foliage of young Tung trees.**—*Plant Physiol.*, xx, 2, pp. 283–288, 1945.

The authors' investigations showed that copper and zinc deficiencies were definitely associated with a reduced rate of apparent photosynthesis in leaves of young tung trees [*Aleurites fordii*: *R.A.M.*, xxiii, p. 463], less in the case of zinc deficiency than in that of copper; even leaves on deficient plants which appeared normal showed a highly significant reduction in carbon dioxide assimilation.

Zaprometov (N. G.). Болезни Шелковицы. [Mulberry diseases.]—State Publishing Department, Tashkent, 76 pp., 22 figs., 1945.

This work is an enlarged edition of the author's handbook under the same title, published in 1937 [*R.A.M.*, xvi, p. 785], and his list of recognized mulberry diseases

in Russia has been expanded from 23 in the older work to 39 in the present volume; but new work on mulberry powdery mildew (*Phyllactinia suffulta* f. *moricola* Jacz.) [cf. *P. corylea*: loc. cit.; cf. also ibid., xix, p. 549] is reported.

Powdery mildew is one of the most widespread diseases of the mulberry leaf, with a geographical distribution embracing Italy, Japan, India, Indo-China, Burma, Tanganyika Territory, Madagascar, Mozambique, Formosa, Manchuria, China, Iceland, and the United States.

In addition, two other mildews are recorded, *Uncinula geniculata*, widely prevalent in eastern United States, and *U. mori*, found in Japan.

P. suffulta f. *moricola* attacks the under side of the leaf and the two others the upper side. Examination of collections made in Tashkent, Ferghana, the Samarkand provinces of Uzbekistan, Southern Kirghizia and the Leninabadsk province of Northern Tadjikistan showed that the sole agent was this fungus. It is believed also to be prevalent in Afghanistan and Persia. The mildew overwinters in the perithecial stage on fallen leaves and on the shoots. They usually mature at the end of July or August in the following year. Control measures recommended include the improvement of plant sanitation and cultural methods and spraying with sulphate of lime solution early in spring.

Other fungi and diseases recorded include *Bacterium mori*, *Bact. tumefaciens*, *Cylindrosporium maculans*, *C. moricola*, *Armillaria mellea*, *Rosellinia necatrix*, *Sclerotinia sclerotiorum*, *Botrytis cinerea*, *Steganosporium sirakoffii*, a virus disease, 'nitevidnost', causing filiform malformation of the leaves, mosaic, and mosaic with leaf curl.

Jørstad (I.) & Roll-Hansen (F.). **Melding om sykdommer på skogtraer i årene 1936–1941.** [Report on forest tree diseases in the years 1936–1941.]—25 pp., Oslo, Nasjonal Samlings Rikstrykkeri, 1943. [Received September, 1945.]

The following are some of the observations, besides those already noticed from other sources, presented in this report on Norwegian forest tree diseases from 1936 to 1941 [cf. *R.A.M.*, xv, p. 618]. The aecidial stage of *Pucciniastrum padi* was very prevalent and sometimes destructive on spruce cones [ibid., xx, p. 1] in a number of localities. The alternate (uredo-teleuto) phases of the rust were found on sweet cherries and plums only in the east of the country where spruces are plentiful; the bird cherry [*Prunus padus*], on the other hand, is also attacked in the north and west, with their sparse population of spruces. *P. virginiana* was observed in one locality in 1939 to bear teleutospores of the rust, whilst *P. mahaleb* in another, apparently wild, a new host for Norway, only showed uredospores.

Notes are given on a number of virulent outbreaks of *Chrysomyxa abietis* on spruce [loc. cit.], which extended its northerly range to 69° 35′ N. The rust was also detected on *Picea pungens* and *P. engelmanni*.

Nursery spruces are not infrequently killed during snowy weather by a fungus with a grey to dark-coloured mycelium reminiscent of *Herpotrichia nigra* [ibid., xxiii, p. 49], which may either be sterile or give rise to pycnidia of different types. For instance, those on one-year-old trees in a Telemark nursery in 1928 contained hyaline, unicellular, straight or slightly curved conidia, 3·5 to 5 by 1·3 to 1·6 μ, while in two-year-old material received from Ullensaker in 1939 the conidiophores were better defined, the conidia smaller (3·5 by 1 μ), and the mycelium more hyaline than usual in specimens of this type. Finally, the fungus which was responsible for the death of a whole batch of two-year-old trees in transit from a southern to an eastern nursery was characterized by a greyish mycelium, more slender than the foregoing.

The basidial stage (*Corticium vagum*) [*C. solani*] of *Rhizoctonia solani* was also found on nursery spruces, this being the first record of its occurrence on conifers in Norway.

Polyporus tomentosus [ibid., xxi, p. 174], a very rare fungus in the country, was observed in 1941 in a mixed spruce and hardwood forest; the fruit bodies were growing directly on the ground, and there is some doubt whether the organism is implicated in the rotting of spruces, though its var. *circinatus* [loc. cit.] was found on living trees in 1938.

Melampsora pinitorqua [ibid., xv, p. 618] is by no means common, but on the other hand it may be observed year after year heavily infecting young pines growing in the midst of a large aspen population.

There appear to be two races of the noxious pine rust, *Cronartium flaccidum* [ibid., xv, p. 617], in the country, of which the more prevalent, *Peridermium pini*, occurs solely in the aecidial stage, passing from pine to pine, while the other (*P. cornui*) forms its uredo-teleuto stage on peony and *Cynanchium vincetoxicum*. The latter, heteroecious form being found only in the extreme south-east of the country, *P. pini* is presumably responsible for the bulk of the damage to pines in other parts.

The uredo-teleuto stage of another heteroecious pine rust, *Coleosporium campanulae* [ibid., xxiii, p. 156], was observed in various southern localities on a number of *Campanula* spp., *Euphrasia*, *Melampyrum pratense*, *M. sylvaticum*, *Senecio vulgaris* and other *S.* spp., *Sonchus arvensis*, *S. asper*, *S. oleraceus*, *Petasites hybridus*, and *Tussilago farfara*, the connexion with the aecidial phase on pine being in most cases obligatory.

Pestalotia hartigii, mentioned in the senior author's 1935 report as the agent of needle discoloration in pines [in 1934: ibid., xv, p. 618], again occurred in the same very unusual form in 1937 at a distance of a few hundred metres from the first affected tree, which had been felled in the meantime.

A study of *Polyporus* [*Fomes*] *annosus* conducted during the period under review showed the fungus to be fairly widespread in the east of Norway, though less so than in the west, where its ravages are well known. The affected species, in addition to the ordinary Scots pine [*Pinus sylvestris*], were *P. cembra*, *P. contorta* var. *latifolia*, mountain pine, and scrub pine. The fungus is transmissible from pine to spruce and vice versa, as well as between conifers and non-coniferous hosts, e.g., birch, black crowberry [*Empetrum nigrum*], heather [*Calluna vulgaris*], and bilberry.

Douglas firs [*Pseudotsuga taxifolia*] were first observed to be infected by *Rhabdocline pseudotsugae* in 1939, and an investigation in 1941 revealed the presence of this dangerous parasite in a number of localities in Rogaland and Hordaland. In this connexion mention may be made of an Order of the Department of Agriculture, dated 31st January, 1941, and becoming immediately operative, prohibiting the importation into Norway of plants or parts thereof (except seed) of (1) Douglas fir, (2) Weymouth [white] pine (*Pinus strobus*), and (3) any species of *Thuja*, with the object of preventing the introduction or extension of *R. pseudotsugae* and *Phaeocryptopus gaeumanni* (not yet reported from the country) on (1), *Cronartium ribicola* on (2), and *Didymascella thujina* [ibid., xvi, pp. 86, 299] on (3). The last-named was detected, for the first time in Norway, on *T. occidentalis* in 1939, and in 1941 it was again observed on the same species and *T. plicata*.

Birch rust (*Melampsoridium betulae*) [*M. betulinum*: ibid., xxi, p. 243], though very prevalent, does not normally cause extensive damage, but in certain seasons, notably those characterized by a wet early summer and warm, damp late summer weather, it occurs in epidemic form during the latter period, imparting a yellow-brown tinge to the foliage over wide areas and inducing premature leaf-shedding. Of the years covered by the report, 1937 was conspicuous for the virulence of the disease, while considerable damage was also reported from some localities in 1936.

Gnomoniella alniella Karst. was found producing large, grey-white lesions with irregular margins on alder leaves as far north as Ankenes.

In the autumn of 1940 *Botryodiplodia hypodermia* (Sacc.) Petr. caused an elm wilt simulating that due to *Ceratostomella ulmi*. The former organism is not an active parasite, and the branches, some of which also harboured *Thyrostroma compactum* [ibid., xx. p. 609], had presumably been weakened by another agency.

Jørstad (I.). **Uredinales of northern Norway.**—*Skr. norske VidenskAkad.* 6, 145 pp., 1940.

The author describes in this monograph 115 species of rusts known in northern Norway (north of 65°) [cf. *R.A.M.*, xi. p. 675] and a historical summary of collections is given. Of the species recorded *Chrysomyxa abietis* and *Pucciniastrum padi* are occasionally epidemic on spruce [see preceding abstract], and *Sorbus* [*Pyrus*] *aucuparia* is often seriously attacked by *Gymnosporangium juniperi*. *Puccinia coronata*, *P. graminis*, and *Uromyces fabae* are rare.

Tint (H.). **Studies in the Fusarium damping-off of conifers. III. Relation of temperature and sunlight to the pathogenicity of Fusarium.**—*Phytopathology*. xxxv, 7, pp. 498–510, 4 figs., 4 graphs, 1945.

Continuing his studies at the University of Pennsylvania, Philadelphia, on the damping-off of conifers caused by *Fusarium* spp. [*R.A.M.*, xxiv. p. 481], the author tested the relation of temperature variations to the disease and to the growth of the hosts and pathogens in a specially devised apparatus consisting of separate chambers in which air temperatures fluctuated about means at five different levels [see above, p. 6].

A temperature of about 25° C. promoted optimum growth in *F. oxysporum* on potato dextrose agar adjusted to P_H 6 in Petri dishes, while growth was slight at 31·5° and least in the chamber held at 10·4°. The percentage of emergence of *Pinus resinosa* in quartz sand cultures inoculated with the fungus ranged from 0 at 31·5° to 14 at 10·4°, with a maximum of 52 at 16·4°, the corresponding figures at the same three temperatures in the controls being 24, 12, and 70, respectively. Increase in emergence losses and post-emergence damping-off in this species was directly correlated with rising temperatures, both phases of the disease being relatively innocuous at an average temperature of 10°, irrespective of the amount of inoculum. These data suggest the existence of a critical temperature between 10° and 16° below which *P. resinosa* may grow and escape infection by the otherwise deleterious *F. oxysporum*.

Damping-off losses in *P. resinosa* and *P. sylvestris* bore a direct relation to decreasing light intensities, the maximum final stands being obtained in full light. The development of infection in the shaded pots was correlated with the increase in succulence of the hosts and in the growth of *F. oxysporum*, *F. vasinfectum*, and *F. avenaceum* with diminishing light intensities.

Ellis (D. E.) & Gill (L. S.). **A new Rhabdogloeum associated with Rhabdocline pseudotsugae in the Southwest.**—*Mycologia*, xxxvii, 3, pp. 326–332, 2 figs., 1945.

In May, 1939, a disease of one-year-old Douglas fir needles, apparently the same as the needle blight caused by *Rhabdocline pseudotsugae*, was observed near Safford, Arizona. The affected needles showed the presence of an imperfect fungus resembling *Rhabdogloeum pseudotsugae*, the conidial state of *Rhabdocline pseudotsugae*. Needles collected from the same trees a month later bore fruits of *R. pseudotsugae* as well as the imperfect fungus.

In January, 1940, a needle blight also resembling the disease caused by *Rhabdocline* was noted on needles of 1939 origin on young Douglas firs near Cloudcroft, New Mexico. No fungus was observed fruiting, but needles from several trees when placed in moist chambers and kept in the laboratory developed acervuli

on the lower surfaces within one week. A collection from the same trees in March showed the same imperfect fungus. Needles from this material kept in a moist chamber at 15° to 17° C. for a month developed mature fruits of *Rhabdocline*. This test was repeated on several occasions in spring, and the imperfect fungus was invariably followed by the perfect one. Additional collections from the same locality made in March, April, and May showed a progressive increase in the abundance of the imperfect fungus until May, when *Rhabdocline* appeared in nature with the conidial form.

The conidial fungus was successfully grown in culture, the conidia resembling those produced in nature, but being more constricted in the middle in cultures three or four weeks old. They often became two-celled at maturity, and strikingly resembled the ascospores of *Rhabdocline*. In old cultures, they were often thick-walled and dark. In septate spores, one cell often turned dark, while the other remained hyaline. The conidia generally produced one germ-tube, though two-celled spores sometimes produced two. Germination of both hyaline and coloured spores was noted.

The imperfect fungus somewhat resembles *Rhabdogloeum pseudotsugae*, but the spores are smaller, the conidiophores longer, and the underlying hyphal layer is thicker and more conspicuous. Fruiting bodies were present on both sides of the needle in the type collection of *R. pseudotsugae* examined, but on the upper surface only in a Californian collection, whereas in the authors' material fruiting was chiefly on the lower, and only occasionally on the upper, surface. In the authors' opinion, therefore, the conidial form associated with *Rhabdocline* in the Southwest is not *Rhabdogloeum pseudotsugae*. Since its connexion with *Rhabdocline* has not been proved it is regarded as a new species of *Rhabdogloeum* and is named *R. hypophyllum* n.sp. The acervuli are described as hypophyllous, rarely epiphyllous, in reddish-brown, conspicuous spots, scattered or confluent, often in parallel series on either side of the midrib, measuring 130 to 500 μ wide by 35 to 150 μ high. The hyaline, continuous, oblong, straight to slightly curved conidia, often somewhat constricted near the middle, measure 6·7 to 11·1 by 2·2 to 3·7 μ. The slender, simple, continuous or septate conidiophores measure 10 to 56 by 0·9 to 2·8 μ.

The evidence presented strongly suggests that *R. hypophyllum* (but not *R. pseudotsugae*) is a stage in the life-history of *Rhabdocline pseudotsugae*.

Heim (R.). **Les champignons destructeurs du bois dans les habitations.** [Wood-destroying fungi in houses.]—*Circ. Inst. tech. Bot. Trav. publ.*, Sér. H, 1, 27 pp., 23 figs., 1942. [Received September, 1945.]

In this paper, delivered as an address in Paris on 15th April, 1942, the author, after a brief historical introduction, gives full notes in a semi-popular style on a number of wood-destroying fungi, their characters, habitat, geographical distribution, the type of decay they induce, and their prevention and control. The organisms dealt with include *Gyrophana lacrymans* (syn. *Merulius lacrymans*), *Coniophora cerebella* (syn. *C. puteana*), *Poria vaillantii*, *P. xantha* [*R.A.M.*, xix, p. 573], *P. mucida* (syn. *P. vaporaria*) [ibid., xxii, p. 335; xxiii, p. 506], *Phellinus megaloporus* (syn. *P. cryptarum*, *Poria megalopora*) [ibid., xvi, p. 3], *Trametes serialis*, *Leptoporus ruboflavus* (*Polyporus braunii*) [ibid., xx, p. 505], *Lenzites sepiaria*, and *L. abietina*. The text is accompanied by very clear photographs, and there is a bibliography of 31 titles.

Banerjee (S.) & Bakshi (B. K.). **Studies in the biology of wood-rotting fungi of Bengal.**—*J. Indian bot. Soc.*, xxiv, 2, pp. 73–93, 3 pl., 24 figs., 1945.

The authors present the results of studies of six species of Bengal Polyporaceae [*R.A.M.*, xxiii, p. 157], namely, *Polyporus brumalis*, *P. friabilis*, *P. rubidus*,

P. ochroleucus, *Polystictus steinheilianus*, and *Merulius similis*, giving their geographical distribution, the hosts on which they have been recorded, their cultural characters, including habit of growth, colour, rate of growth, sporophore production, and mycelial characters, with some general conclusions on several external factors affecting the vegetative growth and fruit body formation of these fungi in artificial cultures.

Hepting (G. H.). **Decay and staining of Southern Pine pulpwood.**—*Paper Ind.*, xxvii, 3, pp. 379–382, 4 figs., 1945.

This is a discussion, based on the published work of the author and others, of the effects of fungal decay and blue stain on the quality of southern pine [*Pinus* spp.] pulp. Where immediate utilization of the wood is impracticable, the damage from these sources may be reduced by storage during the winter months under conditions permitting of rapid drying.

Young (R. S.) & Pinkney (E. T.). **Determination of sodium fluosilicate in timber preserving solutions.**—*J. S. Afr. chem. Inst.*, xxviii, 1, pp. 10–11, 1945.

Sodium fluosilicate is frequently added to zinc sulphate and similar solutions used as timber preservatives in Northern Rhodesia, and its content should be periodically checked to maintain a concentration toxic to wood-destroying organisms—usually in the ratio of 0·5 per cent. to 5 per cent. sulphate. A special procedure for testing the concentration is described.

Verrall (A. F.) & Hartley (C.). **Lumber shipped green should be protected.**—*Sth. Lumberm.*, clxx, 2131, p. 52, 1945.

Decay of wood in service can often be traced to the use of green or partially seasoned stock that became infected during storage. In Mississippi tests, chlorinated phenate and organic mercurial chemicals, widely used for the control of blue stain in lumber [*R.A.M.*, xxiv, p. 347], protected solid-piled pine stock against both stain and decay for as long as four and sometimes eight weeks. This was accomplished with concentrations of treating solution usually specified for 1-in. lumber. However, for the longer bulking periods a 50 per cent. increase in concentration is recommended. Double-strength solutions gave good results with bulk-piled timbers. It appears possible to reduce the usual treating concentration of these chemicals by up to 50 per cent. or more if 3 to 6 lb. borax are added to each 50 gals. of solution.

McCool (M. M.). **Effect of sodium cyanide on number of fungi, bacteria, and Actinomyces in soil and its value in the control of damping off of seedlings, nematodes, and Cabbage root worm.**—*Contr. Boyce Thompson Inst.*, xiii, 10, pp. 463–472, 1 fig., 1 graph, 1945.

The number of fungi in soil obtained from a vegetable garden was at first reduced by the addition of sodium cyanide at the rate of 250 and 500 parts per million, but the number was increased, as compared with the controls, 28 and 56 days, respectively, after treatment. The total number of bacteria and *Actinomyces* was reduced in two days by the addition of 50 and 100 parts per million, while growth of these organisms was prevented by the addition of 200 and 400 parts per million. The addition of 0·004 gm. or more in solution to dry soil in one-quart Mason jars liberated enough hydrocyanic acid to prevent the growth of *Alternaria* sp. and *Cunninghamella blakesleeana* in tubes of agar placed in the jars. However, when transfers were made to sterilized agar, growth resulted in each case in eight days, except in the case of *C. blakesleeana* from containers to which 0·006 gm. cyanide were added. Six fungi causing seedling damping-off (*Phytophthora* sp., *Pythium* sp., *Rhizoctonia* sp., *Phytophthora* sp., *Alternaria* sp.,

and *Verticillium albo-atrum*) were unable to develop in soil cultures in unsealed containers to which 800 or more parts per million were added; when the containers were sealed for 48 hours, 200 or more parts per million prevented fungal development.

Cultures of *C. blakesleeana*, *Alternaria*, and *Macrosporium* were taken from soil treated with different amounts of sodium cyanide, and growth of each organism took place after they had been in the soil treated with 150 and 200 parts per million for 6, 24, and 48 hours, but when they had been exposed to the treatment for 96 hours, no growth was noted six days after transfer to sterilized agar.

Damping-off of cabbage and pea seedlings was partially controlled by the addition of 200 and 300 parts per million of sodium cyanide to the soil when the containers remained sealed for 48 hours after the salt was mixed with the soil. When sodium cyanide was placed in rows beneath cabbage seed at the rates of 0·06, 0·09, 0·12, and 0·15 gm. per linear ft., damping-off was partially controlled, while rates of 0·075, 0·1, and 0·125 gm. per linear ft. partially controlled damping-off of tobacco seedlings.

Ou (S. H.) & Walker (J. C.). **Anthracnose of garden Pea.**—*Phytopathology*, xxxv, 7, pp. 565–570, 1945.

Garden peas in Wisconsin occasionally suffer heavy damage from anthracnose (*Colletotrichum pisi*) [*R.A.M.*, v, p. 69], which was shown by extensive isolation experiments to be usually associated in the brown leaf, stem, and pod lesions with *Ascochyta* spp. In greenhouse inoculation tests with conidial suspensions of *C. pisi* from potato dextrose agar cultures, mostly on the Perfection and Prince of Wales varieties, the stems reacted only by limited infection round needle wounds, while foliar lesions were confined to mature or senescent material and developed most abundantly at higher temperatures (24° and 28° C.), coinciding with the greater rapidity of ageing under warm conditions. Detached pods contracted infection when inoculated in a moist chamber at 20°. The inoculation of stems with a mixture of *Mycosphaerella pinodes* and *C. pisi* spores, or with the latter several days after the former, resulted in the development of lesions typical of anthracnose as it occurs in the field.

The conidia of *C. pisi* were found to germinate readily on the leaves and stems and to form appressoria [ibid., i, p. 282], only a small proportion of which, however, produced hyphae capable of penetrating the leaves, while entry into the stem was not observed. It would appear from these studies that *C. pisi* acts in the main as a secondary pathogen in the field, especially in respect of the prominent stem lesions.

Five out of 1,200 seeds from naturally infected pods yielded *C. pisi*, indicating the possibility of anthracnose transmission through this channel.

Certification of French Bean seed.—*Agric. Gaz. N.S.W.*, lvi, 8, pp. 349–352, 4 figs., 1945.

The purpose of the French Bean Seed Certification Scheme introduced in New South Wales in 1943–44 [cf. *R.A.M.*, xxii, p. 91] is to ensure that seed of approved varieties free from bacterial blight (*Pseudomonas medicaginis* var. *phaseolicola* and *Xanthomonas phaseoli*) and of a high standard of purity shall be available for sowing. Two inspections are made, one at or about flowering time, and one about 14 days before ripening, when a decision is reached as to whether the crop is of the required standard. A crop may be rejected if showing one or more of the following diseases: *P. medicaginis* var. *phaseolicola*, *X. phaseoli*, or anthracnose (*Colletotricham lindemuthianum*). A tolerance of not more than 5 per cent. for mosaic at the final inspection may be allowed, that for other diseases being at the discretion of the inspector.

Diseases of Carrots.—*Agric. Gaz. N.S.W.*, lvi, 7, pp. 295–298, 5 figs., 1945.

The most important and widespread disease of carrots in New South Wales is the virus disease first studied by Stubbs and Grieve in Victoria [*R.A.M.*, xxiv, p. 134]. The distribution of the disease throughout the year appears to follow the presence of the common carrot aphid (*Cavariella aegopodii*), and for this reason, infection is usually most severe in spring sowings made from July onwards. Carrots sown from mid-December until the end of January generally remain healthy and mature normally, but later sowings mostly become infected. Other diseases sometimes responsible for serious losses are leaf blight (*Macrosporium* [*Alternaria*] *carotae*) [ibid., xxiii, p. 420], leaf spot (*Cercospora carotae*) [loc. cit.], bacterial blight (*Xanthomonas carotae*) [ibid., xxiii, p. 423], root rots due to *Sclerotinia* [*sclerotiorum*: ibid., xxiii, pp. 250, 429], *Sclerotium rolfsii* [ibid., xx, p. 195], and other organisms, and damping-off [ibid., xviii, p. 440; xix, p. 519]. Control measures against these diseases are indicated. Where the virus disease is present, the Osborne Park variety, or selections from it, should be grown.

Ellis (D. E.) & Todd (F. A.). **Control of Lettuce damping-off.**—*Spec. Circ. N.C. agric. Exp. Sta.* 4, 7 pp., 3 figs., 1945.

Owing to the prevalence of lettuce damping-off [*R.A.M.*, xx, p. 242] in North Carolina growers have had to seed two to four times as much plant bed area as they actually need. Post-emergence damping-off, which is more serious than the pre-emergence form of the disease, is due mainly to *Rhizoctonia* [*Corticium solani*], though *Pythium* [? *debaryanum*] is sometimes found in the early stages, and *Sclerotinia* [*sclerotiorum*] is occasionally present. Control consists in seed treatment (against the pre-emergence form) with spergon or cuprocide, the adoption of good cultural practices, including adequate soil drainage, exposure to sunlight, and planting thinly, and treatment of the beds with fermate drench. The first application should be made as soon as the plants are up, and further treatments given at 10- to 14-day intervals throughout the plant-bed season, i.e., five to eight applications are required. The fermate powder should be mixed with water at the rate of $\frac{1}{2}$ lb. per 50 gals., and the mixture applied at the rate of $\frac{1}{2}$ gal. per sq. yd.

Wiant (J. S.). **Mycosphaerella black rot of Cucurbits.**—*J. agric. Res.*, lxxi, 5, pp. 193–213, 7 figs., 1945.

This paper describes an investigation begun at the Market Pathology Laboratory of the U.S. Department of Agriculture, New York, in 1938 and continued until 1942 into a black rot of cucumbers from Puerto Rico [*R.A.M.*, xx, p. 565] and Cuba, caused by the fungus *Mycosphaerella citrullina*, which has also attacked balsam pear (*Momordica charantia*), chayote (*Sechium edule*), Chinese preserving melon (*Benincasa hispida*), Yellow Crookneck squash, and watermelon, all from Cuba, chayote from Jamaica and Puerto Rico, and muskmelon presumably from Venezuela. The decay was also observed twice on domestic Hubbard squash from Virginia and Massachusetts, but it was not found during this particular investigation on domestic watermelon.

The first symptoms on cucumber fruits are small, dark, greasy or water-soaked spots anywhere on the surface of the fruits, roughly circular with well-defined margins, or of irregular shape with indefinite margins. Often a gummy exudate develops at the centre of the lesion and forms a firm deposit when dry. If the colour changes are not marked and the gummy exudate is prominent, the disease may be taken for bacterial spot caused by *Pseudomonas lacrymans*; while larger, darker spots, where no exudate has formed, are similar to early lesions of bacterial soft rot (*Erwinia carotovora*). The most important symptom at the later stages of decay is the blackish discoloration of the affected areas that first develops at

the point of inoculation. Blackening of the lesions is accompanied by a drying-out of diseased tissues, with consequent shrivelling and wrinkling of the cucumber. Unless secondary bacterial decay sets in, the entire fruit becomes a shrivelled black mummy.

Mature pycnidia, brownish at first and subepidermal, are found five days after inoculation on cucumbers held at 70° to 75° F. Pycnidia originating in the mesophyll just below the palisade layer are nearly spherical, and their diameter varies from 109 to 160 μ. The conidia emerge in long, gelatinous horns and are hyaline, either non- or uni-, rarely biseptate, with rounded heads, somewhat constricted at the septa. Measurements of conidia were as follows: non-septate 4·6 to 11 by 2·8 to 5·5 (average 7·7 by 4·0) μ; uniseptate 7·3 to 14·7 by 2·8 to 5·5 (10·3 by 4·4) μ; biseptate 12·8 to 19·3 by 4·1 to 5·5 (15·4 by 4·5) μ.

The numerous nearly spherical to slightly elongated perithecia, with single papillate ostioles and rather heavy, nearly black walls, vary greatly in size; their average diameter was 89 μ. The asci tend to remain joined together at the base, and are clavate-cylindrical to cylindrical, without paraphyses, averaging 52·3 by 10·1 μ with a usual range of 44·3 to 76·1 by 8·9 to 10·6 μ.

The pathogen grows most rapidly in culture at 65° to 85°, optimum 80°. No growth occurred at 95° and it was markedly reduced at 45°. None occurred at 35° in six weeks. Decay of cucumber fruits was very slow at 45° but increased rapidly at 50° to 55°.

Field control through seed treatment and spraying, care in picking and packing to avoid mechanical injury, prompt handling after picking, pre-cooling at 50° or rather lower, and maintenance of temperatures of 40° to 45° during transit are the measures suggested for reducing market losses, particularly for Puerto Rico and Cuban cucumbers.

Whitaker (T. W.) & Pryor (D. E.). **The reaction of 21 species in the Cucurbitaceae to artificial infection with Cantaloupe powdery mildew (Erysiphe cichoracearum DC.).**—*Phytopathology*, xxxv, 7, pp. 533–534, 1945.

At the United States Horticultural Field Station, La Jolla, California, 21 species of 11 genera of Cucurbitaceae were inoculated with *Erysiphe cichoracearum*, which has constituted a grave threat to the south-western cantaloupe industry since 1926 [*R.A.M.*, xxii, p. 193]. The reactions of seven species were characterized by a high level of resistance, namely, watermelon, *Cucumis anguria*, *Cyclanthera explodens*, *C. pedata*, *Ecballium elaterium*, *Luffa acutangula*, and *L. aegyptiaca*. Three native species were susceptible, viz., *Cucurbita foetidissima*, *C. palmata* (both of which have been found infected in the wild state and may be a source of infection for cultivated plants), and *Echinocystis macrocarpa*. No species nearly related to the cantaloupe was found to possess a higher degree of resistance to powdery mildew than the cantaloupe itself, and the probabilities of successful hybridization with the virtually immune but only distantly connected members of the Cucurbitaceae are considered to be remote.

Chester (K. S.). **Prevention of Watermelon diseases.**—*Mimeogr. Circ. Okla. agric. Exp. Sta.* 133, 2 pp., 1945.

In 1944, when an average of 44 per cent. of the Oklahoma watermelon crop was infected by anthracnose [*Colletotrichum lagenarium*], the cost of the disease to growers was estimated at $80,000. Prophylactic measures should include seed disinfection with semesan, arasan, spergon, or cuprocide; spraying the vines with Bordeaux mixture 3–6–50 or dusting them with 20–80 copper-lime dust, the first applications being made when the plants begin to run and two or more subsequent treatments at 10- to 14-day intervals; and crop rotation where practicable.

Wilt or stem rot [*Fusarium bulbigenum* var. *niveum*] is another major disease which sometimes results in the total loss of stands. It is controllable solely by the use of resistant varieties, of which the most suitable for the State are Hawklee, Blacklee, Improved Kleckley Sweet No. 6, and Hawkesbury Wilt Resistant.

Stem-end rot [? *Diplodia* spp.], the agent of decay both in the field and in transit, is preventable by field sanitation, careful handling, and disinfectant treatment of the cut skins. The development of infection in transit may be reduced by the insertion into a fresh cut in the skin, just before loading, of a disinfectant paste, which may be obtained ready for use on the market or prepared at home by cooking together 3½ qts. water, 8 oz. copper sulphate, and 8 oz. starch mixed with 1 pint water.

HEIM (R.). **La culture familiale des champignons alimentaires. Ses possibilités actuelles.** [The domestic cultivation of edible fungi. Its present possibilities.] —Reprinted from *C.R. Acad. Agric. Fr.*, 8 pp., 1941. [Received September, 1945.]

Brief, practical notes are given on the domestic cultivation of edible mushrooms, including *Psalliota campestris*, *Volvaria volvacea*, *Pholiota aegerita*, and morels [*Morchella* spp.].

PRICE (W. C.), WILLIAMS (R. C.), & WYCKOFF (R. W. G.). **The electron micrography of crystalline plant viruses.**—*Science*, N.S., cii, 2646, pp. 277-278, 1 fig., 1945.

Electron micrographs of ultracentrifugally purified viruses of tomato bushy stunt [*R.A.M.*, xviii, p. 143], tobacco necrosis [ibid., xviii, p. 348] and southern bean mosaic [ibid., xxiv, p. 132], produced by the authors with the aid of metal shadow casting [ibid., xxiv, p. 434], are considered greatly to assist the electron microscopic study of elementary particles of viruses [ibid., xxiv, p. 265]. In a typical photograph of southern bean-mosaic virus, magnified 58,000 times, the particles were seen to be mostly packed densely in ordered array. In some places the arrangement of the particles was only one layer deep and may be described as a two-dimensional crystal, and at other points the ordered layers are superimposed one above the other to produce the three-dimensional regularity characteristic of true crystallinity. Other photographs disclose greater regularity in the disposition of the particles as the number of layers increased. Well-defined crystal faces and edges have developed on the thicker preparations.

In the case of the bushy-stunt virus the particles tended to cover the entire substratum before forming into three-dimensional patterns, and their two-dimensional patterns exhibited a higher symmetry than that shown by the bean-mosaic virus.

NEUWEILER (E.). **Pflanzenschutz.** [Plant protection.] *Ex* **Bericht über die Tätigkeit der Eidg. Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon für die Jahre 1938 bis 1942.** [Report on the work of the Federal Agricultural Experiment Station Zürich-Oerlikon for the years 1938 to 1942.] *Annu. agric. Suisse*, xlv, pp. 404–414, 1944.

During the period covered by this report [cf. *R.A.M.*, xx, p. 4], 23 cases of potato wart (*Synchytrium endobioticum*) were investigated, of which 16 occurred in 1940; most of the outbreaks were on the sites of earlier foci of infection. Since the original detection of the disease in Switzerland in 1925 [ibid., v, p. 124], its presence has been confirmed in 161 municipalities. The fungus has been held in check by the

conversion of infested areas into meadowland and the cultivation of immune varieties.

The best control of potato late blight (*Phytophthora*) [*infestans*] was given by 2 per cent. Bordeaux mixture, but in view of the prevailing copper shortage the admixture of 0·5 per cent. lime-sulphur with the former preparation at 1 or 1·5 per cent. is recommended, while other effective combinations included 0·5 per cent. Bordeaux mixture with either 0·5 per cent. magnesium sulphate, 1 per cent. tannin extract AF b (J. R. Geigy AG., Basle), or 0·5 per cent. and copper Sandoz [ibid., xxiii, p. 91].

Rhizoctonia [*Corticium*] *solani* interfered with the emergence of potato seedlings [ibid., xxiii, p. 405] in cold spring weather; hoeing and manuring promote the rapid development of the host and so help to counteract the effect of the pathogen.

Immersion in a number of German seed disinfectant preparations [which are specified] effectively combated wheat bunt [*Tilletia caries* and *T. foetida*]. Betanal (Schering) at a dosage of 8 gm. per 100 gm. seed-clusters) gave satisfactory control of beet root rot (*Phoma betae*).

A table is given showing the diseases and pests observed in each of the four years comprised in the report, from which it may be noted that bacterial ring rot (*Bacillus* [*Corynebacterium*] *sepedonicum*) was present on potatoes throughout the period.

Witte (H.). **Redogörelse för verksamheten vid Statens centrala Frökontrollanstalt under tiden 1/7/1942–30/6/1943.** [Report on the work of the State Seed Testing Station for the period from 1st July, 1942 to 30th June, 1943.]—*Medd. Frökontrollanst. Stockh.*, *1944*, 19, pp. 3–73, 1944. [English summary.]

The following items of phytopathological interest occur in this report [cf. *R.A.M.*, xxiii, p. 127]. Loose smut of brome grass (*Ustilago bromivora*) [ibid., xxii, p. 361] was present in eight out of 159 samples, and *Tilletia decipiens* on creeping bunt [*Agrostis stolonifera*: ibid., xvii, p. 825] in seven out of 33.

Of 21,970 different untreated cereal seed-grain samples analysed for *Fusarium* contamination, an average of 60·3 per cent. was clean, the corresponding figures for very slight, slight, heavy, and very heavy infection being 19·4, 11, 5·6, and 3·2 per cent., respectively; the species attacking rye [*Calonectria graminicola*] was notably prevalent.

Ascochyta pisi was prevalent in pea samples, especially those of the sugar and marrowfat types (67 and 42 per cent., respectively), and occasionally infected dwarf beans. *Macrosporium commune* [? *Pleospora herbarum*] was also detected in bean seed.

Under the potato certification scheme the maximum incidence of virus diseases permitted was 5 per cent., of which leaf roll, streak [potato virus Y], and severe mosaic should not exceed 2 per cent. Of 582 fields examined from this standpoint, 373 (64 per cent.) were approved.

Annual Report, Cawthron Institute, Nelson, New Zealand, 1944–5.—31 pp., [1945.]

In the sections of this report (pp. 14–23) dealing with research on fruit, tomatoes, and tobacco in New Zealand during the period under review [cf. *R.A.M.*, xxiv, p. 6], it is stated that the Cox's Orange and Sturmer apple trees at Tasman and Braemar treated with magnesium-containing compounds in 1939–40 and 1940–1 have steadily improved, benefit being particularly marked on the trees treated in both seasons. Dolomite, particularly when applied at the rate of 12 lb. per tree in one season or 6 lb. in two, consistently gave more enduring benefit than magnesium carbonate and much more than magnesium sulphate, applied at equivalent magnesium contents.

Tomato cloud [loc. cit.] was widely prevalent on outdoor crops. The condition was again ascertained to be associated with heavy watering, and was much reduced where the normal watering programme was restricted.

Inspection of the seedling-beds of 12 tobacco-growers in the Dovedale, Stanley Brook, and Pangatotara areas showed slight to moderate infection by angular leaf spot [*Pseudomonas angulata*: loc. cit.] in four cases. Arrangements were made for the affected beds to be sprayed with Bordeaux mixture. A field inspection of 53 tobacco-gardens in different parts of the tobacco-growing areas made subsequently showed a rather wide distribution of the disease in the Riwaka and Motueka districts, though the Dovedale and Stanley Brook areas were comparatively unaffected.

Experimental evidence gave some indication that both formalin and urea reduce mosaic in tobacco seedling-beds. Heavy nitrogenous manuring of the seedling-beds again increased the prevalence of mosaic. Milk and tannin sprays conferred a high degree of immunity on seedlings where a mosaic-virus spray was applied later.

Bertus (L. S.). **Plant pathology.**—*Adm. Rep. Dir. Agr. Ceylon, 1943*, p. D 5, 1945.

In this report [cf. *R.A.M.*, xxiii, p. 165] it is stated that in June and July, 1943, *Helminthosporium oryzae* [*Ophiobolus miyabeanus*] caused epidemic infection of rice in the Uva district of Ceylon, where it has not previously been serious. The four months' varieties, Hondarawala, Suduwi, Karayal, Rathkunda, Samba, Perillanel, and Vellai Illankalayan were all equally affected. The outbreak appears to have been favoured by exceptionally humid weather, the presence of the fungus in appreciable amount, and the poor condition of some of the plants.

The young citrus trees affected by exanthema [loc. cit.] were treated by draining and pruning, with and without the application of lime, copper sulphate, or cattle manure. After one year, no treatment had had any appreciable effect.

Richardson (A. S.). **Annual Report on the Department of Agriculture, Uganda, for the period 1st July, 1943–30th June, 1944.**—10 pp., 1945.

In the section of this report [cf. *R.A.M.*, xix, p. 646] dealing with work on cotton and food crops (pp. 6, 7), it is stated that the development by genetic methods of cotton strains resistant to blackarm [*Xanthomonas malvacearum*: ibid., xxii, p. 304; xxiv, p. 449] was continued at Kawanda and Serere. In district trials, the strongly resistant B. 181 cotton gave the heaviest yields in the Eastern Province, notably in Usuku, where it proved in every way superior to the local variety, S.P. 84. In north-west Uganda, S. 2103, a mass selection from N. 17, outyielded B. 181.

The cassava mosaic [ibid., xxii, p. 7] elimination trials were continued at Serere, and the formal testing of resistant clones for agricultural characters, taste, and keeping qualities was begun. The resistant clones were also grown for observation at 11 substations in different parts of Uganda. Mosaic resistance was well maintained under very severe conditions, and the information so far available justifies the issue of seven varieties for provisional multiplication. Brown streak disease of cassava [ibid., xxiv, p. 442] was found in Uganda by Dr. Storey and Mr. Nichols of Amani.

Potato blight (*Phytophthora infestans*) caused no trouble during the period under review. Work at Kawanda in the presence of the other common diseases indicated that the local blue potato (probably Skerry Blue) is the most productive variety under these conditions. It stores, however, for an even shorter period than the average Uganda potato.

Evidence obtained at Serere showed that groundnuts should be sown at the earliest date at which there is a reasonable prospect of securing a good stand without re-sowing, i.e., about the second week in March. Later sowings are increasingly affected by rosette, and give much smaller yields.

Rapport annuel pour l'exercice 1939. [Annual report for the year 1939.]—*Publ. Inst. nat. Étud. agron. Congo belge* (hors sér.), 301 pp., 1 graph, 2 maps, 1941. Fr. 35. [Received November, 1945.]

In the section of this report (pp. 43–47) dealing with plant diseases at Yangambi and Bambesa, Belgian Congo, during the period under review [cf. *R.A.M.*, xxiii, p. 431], R. Steyaert mentions that oil palms in the former locality showed a trunk infection apparently due to a *Fusarium*, while *Hevea* rubber was attacked by *Rigidoporus microporus* [*Fomes lignosus*]. At Bambesa, further work strikingly confirmed earlier results obtained in the selection of cotton strains resistant to stigmatomycosis [*Nematospora coryli* and *N. gossypii*: ibid., xviii, p. 797]. In conformity with the regulations governing the export of cotton seed outside the Bambesa area, 1,500 plants were marked out for seed production, and of these 22 were found to be affected with wilt (*Fusarium vasinfectum* [loc. cit.] and *Verticillium dahliae*). The disease is becoming progressively worse locally. Whereas over 1,000 cases were found in 1938–9, in 1939-40 the figure, up to November, was nearly 10,000. In the cotton-growing areas of the Uele the whole of the district east of a line joining Bafwasende, Poko, Niangava, and a point on the Sudanese frontier between Dungu and Bafuka must be regarded as infected. To the west of this line, there are infection centres of *F. vasinfectum* at Bambesa and of *V. dahliae* in the Plantation at Dangabu and Dingila.

Sweet potatoes at N'dele in the Ituri district were affected by a condition apparently due to a virus [cf. ibid., xxiv, p. 117].

Fawcett (G. L.). **Departamento de Botánica y Fitopatología.** *Ex* **Memoria anual del año 1943.** [Department of Botany and Phytopathology. *Ex* Annual Report for the year 1943.]—*Rev. industr. agríc. Tucumán*, xxxiv, 7–12, pp. 149–151, 1944.

During the period under review [cf. *R.A.M.*, xxiii, p. 253], *Frankliniella paucispinosa*, the insect vector of tobacco 'corcova' [tomato spotted wilt virus: ibid., xx, p. 501; xxiv, p. 477] was detected on the flowers of various common plants, including *Medicago lupulina*, *M. hispida*, and *Melilotus alba*, and it is also a constant visitor to the Solanaceae, e.g., *Cestrum* and *Nicotiana* spp.

The only sugar-cane variety at present sustaining economic damage from smut (*Ustilago scitaminea*) [ibid., xxiv, p. 338] is P.O.J. 36, but the disease has occasionally assumed a severe form on Tuc. 472 and Tuc. 1376, the cultivation of which will probably have to be discontinued.

The chestnut-coloured leaf spot of cotton caused by *Verticillium albo-atrum* [ibid., xxiii, p. 254] is most prevalent in low-lying, heavily irrigated soils, and spares none of the many varieties grown at the Tucumán Agricultural Experiment Station.

D'Oliveira (Maria de L.). **Doenças bacterianas das plantas em Portugal. I – 'Pé negro' e 'podridões úmidas'.** [Bacterial diseases of plants in Portugal. I—'Black leg' and 'wet rots'.] —*Agron. lusit.*, v, 3, pp. 227–240, 1943. [Received October, 1945.]

A tabulated account is given of comparative studies on the morphological and biochemical characters, pathogenicity, and host range of ten bacterial isolates from the following sources: two from potato plants suffering from black leg [*Erwinia phytophthora*], one in Essex, England, and the other at Moita, Portugal, where the disease causes heavy losses from time to time; two from turnips affected by wet rot, one at Cambridge and the other in Portugal; one from the interior of a celery plant with wet rot on the Cambridge market; one from cabbage at Cambridge with the central portion of the head, bases of the petioles, and medullary tissues of the stem rotten, damp, and malodorous; one from kale in a Lisbon park with wet rot of the stem and petiole bases; one from vegetable marrow fruits in a field near Cambridge,

where wet rot is prevalent; one from melons in a Lisbon park which developed a very watery spot soon after storage; and one from broad beans, with wet rot of the stems in the same locality.

On potato agar the isolates from all the above-mentioned hosts were mutually indistinguishable in shape and colour. They consisted of cylindrical, highly mobile cells with more or less rounded ends, occurring mostly singly but occasionally in pairs or exceptionally in short chains, measuring 0·9 by 0·4 to 1·2 by 0·7 μ when separate or 1·5 by 0·4 to 2 by 0·7 μ in couples, provided with a variable number of peritrichiate flagella, generally 2 to 5, Gram-negative, and non-acid-resistant. The colonies are luxuriant, white, sometimes turning cream-coloured, smooth, and transparent. On potato dextrose agar the growth of the Essex potato strain was yellow or chestnut and that of the Cambridge cabbage isolate pale or deeper yellow. A greenish pigment secreted by the vegetable marrow isolate on this substratum was lost on transplanting to nutrient agar. On meat broth agar the colonies are more scanty, compact, dirty white, and smooth. All the isolates liquefy gelatine, the Essex potato strain being the most active in this respect, and all coagulate milk and reduce litmus.

Turning to biochemical characters, certain differences are apparent between the several isolates, but no relationship was found to exist between the origin of a strain and its reactions. For instance, the fermentations of maltose by the potato black-leg isolates was the only consistent character differentiating them from the soft-rot isolates. Of the two former, one produced gas on all carbohydrates except maltose and the other failed to produce gas on a single one, whilst one of the two strains from cabbage formed gas but not the other.

In cross-inoculation experiments the Essex potato isolate attacked Portuguese cabbage, cauliflower, turnip, vegetable marrow, melon (very slightly), carrot, radish, tomato, *Schizanthus pinnatus*, and *Nicandra physaloides*; the English turnip strain was pathogenic to the same plants (more so to melon than the foregoing) and also to cucumber; the celery and vegetable marrow isolates caused little or no damage to any of the other plants tested; the Cambridge cabbage strain infected all except broad bean and celery; the Portuguese potato isolate was more or less pathogenic to all except celery and cucumber; that from Portuguese kale and turnip attacked all except celery, which in fact was susceptible only to its own strain; the melon isolate infected potatoes (the tubers very slightly), vegetable marrow, carrot, and cucumber (very slightly); and the broad bean was pathogenic to potato stems, vegetable marrow (very slightly), and melon (fruits only partially involved).

Petersen (H. I.). **Afsvampningens Omfang i Danmark.** [The extent of fungicidal treatment in Denmark.]—Reprinted from *Lolland-Falsters Landbrugstid.*, *1945*, 34, 2 pp., 1945.

The following are among the data presented in this tabulated survey of the statistics of cereal seed-grain disinfection in Denmark in the autumn of 1943 and the spring of 1944. The percentages of farms on which treated seed was used in the islands (comprising Zealand, Bornholm, Lolland-Falster, and Fünen), Jutland, and the country as a whole were 77·8, 65·8, and 70·2, respectively. In general, the practice was more widely adopted on the larger farms than on the smaller ones. Only 14·1 per cent. of the farmers included in the investigation carried out the treatment exclusively at home, 72·7 per cent. entrusted the work entirely to seed-cleansing installations, while 13·2 per cent. made use of both methods. The proportion of seed-grain submitted to treatment over the entire country was 66·3 per cent., the figures for the individual crops being 94·1 per cent. for wheat, 51·4 for rye, 83·1 for barley, 62 for oats, and 50·1 for mixed seed. Dusting was employed by the great majority (92 per cent.) of the seed-cleansing plants, while farmers in general (70 per cent.) preferred liquid treatments. Mercurial preparations have

almost entirely superseded copper sulphate and formalin and were used by 99·3 per cent. of the commercial establishments interrogated.

Barducci (T. B.). **El Trigo 'Maria Escobar' y posibilidades de su cultivo en los Valles Centrales de la Costa.** [The Wheat 'Maria Escobar' and possibilities of its cultivation in the central coastal valleys.]—*Bol. Estac. exp. agríc., Lima*, 25, 34 pp., 23 figs., 1 diag., 1 graph, 1 map, 1944.

Black stem rust of wheat (*Puccinia graminis*) occurs exclusively in the teleutospore phase in the coastal regions of Peru [*R.A.M.*, xxiii, p. 334], where barberry, the aecidial host, is absent. Hence, the physiologic races of the rust in these localities, viz., 48, 189 [ibid., xxii, p. 57], 14, and 15 (the two last-named recently determined by V. A. Revilla), remain reasonably constant. The Maria Escobar variety (38 M.A. × San Martin 28), which has been resistant to the rust in tests extending over 13 years in and around Lima, gave a moderately resistant to moderately susceptible reaction in inoculation trials with race 15 in 1944. However, considering that the conditions normally prevailing in the field are unlikely to be as conducive to infection as those artificially fostered for experimental purposes, Maria Escobar may probably be safely grown in the Lima district if sown before the critical period for attack, i.e., the end of October.

Oort (A. J. P.). **De verspreiding van de sporen van Tarwestuifbrand (Ustilago tritici) door de lucht.** [The dissemination of Wheat loose smut (*Ustilago tritici*) spores through the air.]—*Tijdschr. PlZiekt.*, xlvi, 1–2, pp. 1–18, 3 diags., 1940. [English summary. Received November, 1945.]

A tabulated account is given of experiments carried out in Holland, at Sprundel and Wageningen, to ascertain the reason for the abnormally heavy increase of wheat loose smut (*Ustilago tritici*) [*R.A.M.*, xxii, p. 246] even in crops approved by field inspection for sowing seed and therefore containing not more than six diseased plants per 100 sq. m. At Sprundel, hot water-treated Juliana seed was sown at a distance of at least 2 km. from other wheat fields, a plot of heavily inoculated seed serving as inoculum, while at Wageningen, disinfected Vilmorin 27 seed was sown along two sides of a field in which loose-smut experiments were in progress. In both places the spores spread from the source of infection to the edge of the experimental areas, but at Sprundel dissemination was very markedly in a south-east direction and even at a distance of 70 m. 11 smutted heads per 100 sq. m. were counted, while at Wageningen, where dissemination was more general, 1 to 3 per 100 sq. m. were present 50 to 90 m. away from the origin of infection.

When strong winds are blowing, notably from the south-east and east, the dissemination of the spores is heavy and uniform, pointing to their conveyance on a horizontal plane, whereas light and moderate winds tend to cause an erratic mode of spread, presumably through the action of vertical air currents, so that smutted 'islands' alternate with healthy ones.

In view of these observations, inspectors are advised to reckon with the possibility of the spread of loose-smut over a radius of a few hundred metres in all directions at flowering time.

Poehlman (J. M.). **A simple method of inoculating Barley with loose smut.**—*Phytopathology*, xxxv, 8, 640–644, 1945.

A simplified procedure for the inoculation of barley with loose smut (*Ustilago nuda*), possessing various advantages over M. B. Moore's [*R.A.M.*, xv, p. 567], has been successfully applied at the Department of Field Crops, University of Missouri, Columbia. It consists in the injection into each floret of a spike, by means of a 1 in. 25-gauge hypodermic needle, of a few drops of a chlamydospore suspension from a rubber bulb of 10 c.c. capacity, the operation being performed a day or two after the breaking of the boot. The suspension was prepared from fresh inoculum

obtained from ten winter barley varieties. The fragments of the smutted heads were placed in a cheesecloth square and immersed in tap water, the spores strained through the fabric, and sufficient dextrose added to the suspension to make a 1 per cent. solution. Three heads were used for each variety or selection, and 30 to 40 heads could be inoculated in an hour.

In the C.I. winter barley group, 80 of the 180 selections (44·4 per cent.) contained over 20 per cent. smutted heads, 42 (23·3) over 40 per cent., and 15 (8·3) over 60 per cent., the corresponding figures for 42 standard varieties being 12 (28·6), 7 (16·7), and 1 (1·4), respectively, and for 20 selections of Early Beardless 4 (20), 1 (5), and nil, respectively.

Honecker (L.). **Erbanalytische Untersuchungen über das Verhalten der Gerste gegenüber verschiedenen physiologischen Rassen des Mehltaues (Erysiphe graminis hordei Marchal).** [Genetico-analytical studies on the reaction of Barley towards different physiologic races of mildew (*Erysiphe graminis hordei* Marchal).]—*Z. PflZücht.*, xxiv, 4, pp. 429–506, 1 fig., 1942. [Abs. in *Plant Breed. Abstr.*, xv, p. 348, 1945.]

Further analytical studies on the hereditary aspect of the reactions of barley varieties to nine physiologic races of mildew (*Erysiphe graminis hordei*) at the Bavarian Plant Breeding Station, Weihenstephan [*R.A.M.*, xx, p. 251; xxiii, p. 11], are fully described and tabulated.

The resistance of Pflugs Intensiv to race A is monomerically determined and semi-dominant; the variety is susceptible to race B. Ragusa b, originating from a Dalmatian land barley, is resistant to both these races, its reaction to B being governed by a single dominant factor, while its resistance to A depends on a different gene from that carried by Pflugs Intensiv.

The resistance of CP 103 21 (a cross between Criewener 403 and Pflugs Intensiv) to race D is incompletely recessive and is determined by the same gene as that conferring resistance to A in Pflugs Intensiv. Neither this gene nor the one responsible for the resistance of Ragusa b to Race B is linked with the *Z* alleles affecting the number of spikelet rows.

The resistance of Ragusa b to A and B is believed to depend on a single major gene *B*, and that of CP 103 21 on a gene *d*. The minor factors *Nek* (necrosis) and *Chl* (chlorosis), hypostatic to *B*, modify the manifestations of resistance in the offspring of Ragusa b. Another modifying gene *n* (necrotic fleck) affects the degree of resistance shown by progenies derived from Ackermanns Isaria, while the use of Palestine C.J. 939 as a parent has led to the recognition of three further modifying factors, P_1, P_2, and P_3, which influence the degree of resistance to races A, B, C, D, and H. Genes controlling resistance were also studied in crosses having Gopal C.J. 1091 as one of the progenitors.

Leukel (R. W.) & Livingston (J. E.). **Smut control in Sorghum and effect of dust fungicides and storage on emergence.**—*Phytopathology*, xxxv, 8, pp. 645 - 653, 1945.

Further field tests were conducted in 1943 and 1944, mostly in Kansas, Nebraska, and Maryland, to determine the relative efficiency of various fungicidal dusts in the control of sorghum covered kernel smut (*Sphacelotheca sorghi*) and their effects on emergence [*R.A.M.*, xxii, p. 203; xxiii, p. 103]. In Sharon kafir in 1943 emergence was significantly improved by seed treatment with new improved ceresan, copper carbonate, spergon, arasan, Du Bay 1452-C, leytosan, and morpholine thiuram-disulphide, a similar action being exerted on Leoti sorgo by copper carbonate (2 oz. per bush.), arasan (1 and 2 oz.), and Du Bay 1452-C ($\frac{1}{4}$ oz.). On the other hand, emergence in the latter variety was appreciably reduced by new improved ceresan ($\frac{1}{2}$ oz.), Du Bay 1452-C ($\frac{1}{2}$ oz.), merc-o-dust ($\frac{1}{2}$ and $\frac{1}{4}$ oz.), and sulphur (2 and 1 oz.).

Comparable increases were secured in both varieties in 1944 with new improved ceresan, copper carbonate, arasan, spergon, U.S.R. 604 (dichloro naphthoquinone) [ibid., xxiii, p. 265] (1 and 2 oz.), fermate (1 and 2 oz.), zincate (zinc dimethyl dithiocarbamate) [ibid., xxiv, pp. 195, 266] (1 and 2 oz.), and basic copper sulphate (1 and 2 oz.).

In 1943, when the incidence of kernel smut in Sharon and Leoti amounted to only 22·3 and 13·2 per cent., respectively, all the treatments gave reasonably good control of the disease except merc-o-dust, which proved completely ineffectual. In 1944, new improved ceresan (½ oz.), copper carbonate (1 oz.), spergon (1 oz.), U.S.R. 604 (1 oz.), and basic copper sulphate (2 oz.) reduced the percentage of smutted heads in Sharon from 61·3 to less than 1. In the plots raised from seed treated with 2 oz. arasan, there was 1·1 per cent. infection [ibid., xxiv, p. 187], while zincate, fermate, and sulphur were less effective and 1 oz. arasan failed to control the pathogen. Under conditions promoting severe infection at Wilmington, Delaware, in 1944, only Du Bay 1452-F and new improved ceresan, both at ½ oz., satisfactorily combated *S. sorghi* in Scarborough broomcorn, a variety with persistent glumes, the former reducing the percentage of smutted heads from 75·7 to 2·2 and the latter to nil. Both these preparations gave absolute control of the disease in seven other varieties.

Treated and untreated seed of Club and Sharon kafir, Leoti and Norkan sorgo, and Westland milo was stored at 20° C. and 70 per cent. relative humidity for 180 days, after which period arasan, copper carbonate, and spergon were found to have exerted either a favourable or no effect on germination in steamed soil, while new improved ceresan reduced it significantly in three of the varieties and improved it in one. In unsterilized soil the protective influence of ceresan generally counteracted its harmful tendency, and the other three disinfectants produced a noteworthy improvement. The effects of sulphur, when manifest, were adverse.

Prasad (N.). **Long smut of Sorghum—method of infection.**—*Curr. Sci.*, xiv, 9, p. 239, 1945.

Long smut of sorghum, caused by *Tolyposporium ehrenbergii* [*R.A.M.*, xviii, p. 517; xix, p. 331] occurs, in India, in Baluchistan, Sind, and Madras. In 1943, it was present in almost every earhead examined in the course of a survey in Sind, the number of grains attacked ranging from 1 to 30. No infection resulted in tests in which spores were mixed with seed before sowing, or with soil, or were dusted on to the flowers, or in which Moore's vacuum method of infection [ibid., xv, p. 567] was used, but positive results were obtained when a few drops of a sporidial suspension were placed in the buds, 90 per cent. of the infected earheads subsequently bearing smutted grains.

Evidently, chlamydospores by themselves have no part in the production of the disease. Presumably, the chlamydospores from the previous crop lie in the soil, germinate, and produce sporidia, which are carried by air to the buds and so produce infection.

Kiely (T. B.). **Diseases of Citrus; spray programmes for coastal growers.**—*Agric. Gaz. N.S.W.*, lvi, 9, pp. 391–394, 4 figs., 1945.

This short, popular note advises coastal growers on spray control measures for protecting citrus crops from black spot (*Phoma citricarpa*), melanose [*Diaporthe citri*: *R.A.M.*, xxii, p. 11], lemon scab [*Elsinoe fawcetti*], exanthema, and sooty blotch.

Heiser (D[orothy] G.). **A Nectria disease of Coffee in Western Guatemala.**—*Ann. Mo. bot. Gdn*, xxxii, 3, pp. 287–296, 1 pl., 1945.

Following the rubbing of coffee trees with sacking to remove algae, mosses and lichens, a record harvest was produced in 1935 on the La Soledad plantation in the

San Marcos province of Guatemala. The following year a serious *Nectria* canker disease broke out on the plantation, suggesting that the fungus was already present and was spread by the rubbings. It continues to be noted sporadically throughout the plantation.

The *N.* sp. associated with the disease was studied in material of *Coffea arabica* var. *maragogipes* and deemed to fall within the section *Dialonectria*. It is named *N. dodgei* sp. nov. and is described as follows: perithecia solitary or 2 to 4 aggregate, 140 to 270 μ broad, 160 to 250 μ high, globose or ovoid, smooth, orange; perithecial wall pseudoparenchymatous, about 32 μ thick at the apex and 20 μ at the base, composed of 3 to 5 layers of cells; cells at the apex almost isodiametric, averaging 17 by 15 μ, cells at the base compressed dorsally, averaging 13 by 4 μ; ostiole not papillate, the canal lined with numerous paraphyses; asci about 50 by 5 μ; ascospores hyaline, uniseptate, ellipsoid, not constricted, 7·6 by 3 μ.

The disease occurs usually under good conditions of culture and is characterized by circular or elliptic cankers at the base of the tree. The bark becomes black, the discoloration sometimes reaching as far as the cambium. The blackening extends below the soil and along the tap-root to about 1 ft. below the second laterals. At lower levels the bark appears normal. The outer layers of the bark on the upper laterals show cracking and scaling, with embedded black to dark brown rhizomorphs which change to white as the root becomes smaller. The small rootlets usually remain healthy. The second laterals show white rhizomorphs near the trunk, and little or no infection near the outer ends. The leaves above the canker show irregular mottling at first and then change to greenish-yellow. They are often spotted and usually fall prematurely. There is often some die-back of the twigs as a secondary infection. The fruit is not directly affected, and diseased trees may set a heavy crop the last season before the death of the diseased side.

So far it has proved possible to produce in culture only the imperfect *Fusarium* stage. The aerial mycelium is white, later becoming pinkish or cinnamon-buff on certain media and even grey-vinaceous at the bottom of rice cultures; microconidia straight or allantoid, unicellular, rarely uniseptate, borne in false heads upon simple, occasionally branched conidiophores; macroconidia slightly sickle-shaped, somewhat pedicellate, usually borne in sporodochia. There are no sclerotia or chlamydospores. The conidial measurements are: 0-septate 8·5 by 2 μ, 1-septate 14 by 3 μ, 2-septate 24 by 3·5 μ, 3-septate 34·8 by 3·8 μ, 4-septate 41 by 4 μ, 5-septate 43 by 4·5 μ.

The characteristics distinguishing *N. dodgei* pathologically, physiologically, and morphologically from *N. tropica*, *Hypomyces haematococcus* (*N. anisophila*), and *N. coffeigena*, which are all parasitic on coffee, are described. *N. dodgei* differs from *N. tropica* in its much larger perithecium, measuring 380 to 450 μ, its purple colour, and the radiating, fibrate texture of the perithecia [*R.A.M.*, ix, p. 228]; moreover, the cankers caused by *N. dodgei* are smaller than those induced by *N. tropica*.

Lime-sulphur painted to a height of 3 ft. on the tree trunks, care being taken to see that the solution reaches all the crevices, gave rather more efficient control than Bordeaux mixture.

Inoculations of five-year-old plants of *C. arabica* with a spore suspension of a five-day culture of the *Fusarium* gave inconclusive results, possibly because the variety used differed from that on which the disease was described, or prolonged culture had impaired the virulence of the *Nectria*.

Muskett (A. E.) & Colhoun (J.). **Control of foot rot (Phoma sp.) of Flax.**—*Nature, Lond.*, clvi, 3966, pp. 538–539, 1945.

Further work on the treatment of flax seed with new improved ceresan to prevent foot rot (*Phoma* sp.) [*R.A.M.*, xxiv, p. 230] showed that seed with a moisture content below 10 per cent. when treated with this disinfectant at the rate of 12 oz.

per cent. and kept for 18 weeks in pot. Seed under ordinary storage conditions gave only 71 per cent. germination, as against 98 per cent. for untreated seed. No effect on germination was noted after eight weeks' storage. Similar treatment with ammonia gave no reduction in germination after 18 weeks. When seed with a moisture content of 14 per cent. was treated with new improved formalin at 12 oz. per cwt. and tests were made in the light, germination was reduced to 91 per cent., as against 83 per cent. in the untreated controls. In the treated seeds a further 28 per cent. gave abnormal growth. It is established that it is undesirable to treat flax seed with new improved formalin if its moisture content is over 10 per cent. Treated seed with a moisture content of under 10 per cent. should not be stored for more than eight weeks.

Barrios (T. B.). **Producción de semilla de Lino para la costa.** [Production of Flax seed for the coast.]—*Rep. Estac. exp. agric. Lima* 58, 12 pp., 1944.

Work is proceeding at the La Molina Agricultural Experiment Station, Lima, Peru, on the development of flax varieties resistant to rust (*Melampsora lini*) [*R.A.M.*, xxiii, p. 160], and among the most promising selections are Nos. 243 to 249, descended from line No. 12 of Argentinian (Orno) and Nos. 16 to 39 and 84 to 93, derived respectively from lines 1 to 11 and 1 to 18 of J.W.S., all dating from 1941. Highly encouraging results have also been obtained in the development of superior rust-resistant strains of Linda flax by mass selection.

The economic position of producing seed from the mountains for cultivation in coastal districts has of late been restricted by the discovery of 'pasmo' disease (*Phoma linicola* [Naborella Leonard, *Bull. agric. Lima*, xxi, p. 451]) in the former regions, spreading from the north westwards.

Serrell (E. H. P.) & Simpson (B. B.). **Curly-top and California Aster yellows diseases of Flax.**—*Phytopathology* xxxv, 5, pp. 401–406, 4 figs., 1945.

The beet curly-top virus was shown by the senior writer in 1939 to be experimentally transmissible to flax [*R.A.M.*, xix, p. 624], but natural infection (up to 7 per cent.) of the latter was first observed in central California in March, 1944. Early plantings of the previous October and November were more severely damaged than later ones, which probably owed their escape to the seasonal migration of the vectors of the virus (*Eutettix tenellus*) in the summer. Moreover, as the normal period for the early-planted flax in 1943 the scanty rainfall limited the feeding areas of the leafhoppers to cultivated crops, of which flax was the principal. The symptoms of curly-top on flax include irregularity and weakness of the leaves, which are closely grouped at the growing point, gradual chlorosis of the whole plant, usually followed by death, marked reduction of the inflorescences, and torsion and blackening of the petals accompanied by failure to expand, desiccation, and eventual withdrawal shedding from the ovary, and a pronounced orange-yellow discoloration of the top-most and crown pillows. Plants infected when a height of 8 to 10 in. has been reached often continue to grow and develop the characteristic foliar symptoms and a pulling of the stem up; the subsequent branches tend to be deflected from their normal position, resulting in a spreading rather than an erect growth habit. The virus was recovered from naturally infected flax by previously non-viruliferous leafhoppers and transferred to healthy sugar beets, which contracted typical curly-top symptoms.

Flax raised from seed was experimentally infected with the California aster-yellows virus by means of the short-winged aster leafhopper (*Macrosteles divisus*) and a long-winged race of the same species [*ibid.*, xxii, p. 206; xxiii, p. 420]. The first symptoms is chlorosis of the apical leaves of the stems, the ends of which give rise to secondary shoots, while further developments comprise floral virescence and proliferation and reduction or absence of petals.

Wilson (M.), Noble (Mary), & Gray (Elizabeth G.). **The blind seed disease of Rye-grass and its causal fungus.** —*Trans. Proc. Bot. Soc. Edinb.*, xxxi. Part 2 (No. 12), pp. 327–340, 1 pl., 5 figs., 1945. 4*s*.

In this paper, read on 5th July, 1945, the authors, after briefly reviewing earlier investigations into blind seed disease (*Phialea temulenta*) (*R. A. M.*, xxiii, p. 274) of perennial rye grass (*Lolium perenne*), state that in culture on malt agar the mycelium usually produces a white, fluffy mycelium, followed by a light to dark chocolate-brown conidial slime, containing an oily substance which gives it an iridescent appearance, the oily consistency of the slime distinguishing the fungus from *Pullularia pullulans* [ibid., xix, p. 709; xxiv, p. 500]. On germination the conidiospores and macroconidia give rise to a mycelium of branched, septate intertwining hyphae with numerous coils. Within two or three days of germination, macroconidia are produced in succession from the apex of hyphal outgrowths of varying length. They remain clustered round the apex or become detached and lie across the hyphae, so that they may seem to be budded off directly from many points on the hyphal wall. In culture the conidia are cylindrical, hyaline, have rounded ends, measure 16 to 29 by 3 to 5·3 (usually 21 by 4·5) μ, are straight or slightly allantoid, and contain several, often polar oil globules. Catenulate conformation was frequently observed. In culture and on the host, the microconidia which occur in pale pink sporodochia on the seed, develop endogenously, being formed from the terminal portion of unicellular conidiophores; they are unicellular, subcylindrical, hyaline, contain one oil globule, and measure 3·4 to 4·8 by 2·7 to 4·2 (most frequently 4 by 3) μ. Germination was not observed.

Hansen's dual phenomenon [ibid., xvi, p. 580] was observed in this fungus, isolates of single conidia being of two types, conidial, in which a slime is produced, and mycelial, in which there was a growth of white, fluffy mycelium. Microconidia occurred in both types, as did areas of closely packed hyphae. When 10 to 20 single ascospores were isolated from each of a number of apothecia, in many cases all the isolations from a single apothecium were of the same type, either conidial or mycelial, but in some instances approximately equal numbers of cultures of each strain were obtained from the same apothecium. No evidence was obtained of systemic infection of *L. perenne* by the fungus.

Experimental evidence showed that cold, wet conditions favour the disease by prolonging apothecial formation and the pollination and ripening of rye grass and increasing secondary conidial infection. Also, the more often the plants open before pollination, the more often the ovary is exposed to direct infection by wind-borne ascospores.

Dealing with the histology of infected grain, the authors show that if the scutellum becomes infected, the seed usually fails to germinate. An endophyte was repeatedly isolated by the authors from the pith of flowering shoots of *L. perenne* and could be distinguished from *Phialea temulenta* within the grain by its finer hyphae and its restriction to the layer immediately outside the aleurone layer, whereas *P. temulenta* has coarser hyphae, and penetrates to any part of the seed. The authors point out that six fungi showing affinities have been recorded on species of *Lolium* and rye, namely, *P. temulenta*, *P. sessilis*, and various *Lolium* endophytes, and all may be perhaps merely strains of one species. In an addendum they state that they fully agree with Neill and Hyde that *P. sessilis* is identical with *P. temulenta* [ibid., xxiv, p. 230]. Heavily infected seed is generally opaque on the diaphanoscope, while slightly infected and healthy seed is usually translucent. The presence of the fungus does not alter the fluorescence under screened ultra-violet light, caused by the radicles of *L. italicum*, a phenomenon not found in *L. perenne*.

Suggestions for control include the chemical treatment of foundation seed stocks, growing these in drills, and the maintenance of the general health of the crop.

Fricke (E. F.). **Molybdenum trials on pastures in north-western districts.**—*Tasm. J. Agric.*, xvi, 3, pp. 109–111, 1945.

In further pasture trials carried out in Tasmania in 1944 to test the effect of molybdenum applications on soils where clovers and other legumes do not thrive [*R.A.M.*, xxiv, p. 386], the yields obtained in six localities with (*a*) no treatment, (*b*) 1 cwt. superphosphate per acre, (*c*) 1 cwt. superphosphate + 1 ton lime per acre, (*d*) 1 cwt. superphosphate + 12 lb. ground molybdenite (containing 1 lb. molybdenum) per acre, and (*e*) superphosphate + lime + molybdenite at these rates ranged, respectively, from 55 to 273, 95 to 335, 94 to 439, 116 to 526, and 125 to 464 lb. freshly cut herbage per five plots of 1/140 acre. The data obtained showed that superphosphate increased the yield in every case, lime gave an increase in four out of the six localities, molybdenum increased yield in all six tests, while in three of them the response from 1 lb. per acre was greater than that from one ton of lime, and when both lime and molybdenum were applied, in four areas the yield was greater than when either was applied alone.

Thomas (K. M.), Ramakrishnan (T. S.), & Srinivasan (K. V.). **The natural occurrence of ergot in South India—II.**—*Proc. Indian Acad. Sci.*, Sect. B, xxii, 3, pp. 191–192, 1 pl., 1945.

Further new grass hosts of *Claviceps* in South India [*R.A.M.*, xxiv, p. 369] include *Panicum maximum*, *Themeda cymbaria*, and *Digitaria wallichiana*. The conidial characters of the fungus on the first-named host suggest a connexion with the *Claviceps* on *Cynodon dactylon*, and those of the species on *T. cymbaria* and *D. wallichiana* with the *Claviceps* on *Amphilophis foulkesii* and *D. chinensis*, respectively.

C. viridis, already recorded on *Oplismenus compositus* from the Nilgiris and Kodaikanal [loc. cit.], was found on the same host at Yercaud, 5,000 ft. above sea-level in January, 1945.

Müller (D.). **Über Chlorophyll- und Stickstoffgehalt in Hexenringen von Marasmius oreades.** [The chlorophyll and nitrogen content in fairy rings of *Marasmius oreades*.]—*Friesia*, ii, 4–5, pp. 221–224, 1943.

Evidence is adduced that the chlorophyll content of leaves of *Achillea millefolium* outside the fairy rings caused by *Marasmius oreades* [*R.A.M.*, v, p. 685] amount to 39 to 90 per cent. of that of dark green plants in the rings, while the corresponding figures for the nitrogen content were 51 to 79 per cent. The author observes that *M. oreades* exercises a favourable effect on the growth of some plants as, for example, *A. millefolium*, but affects others adversely.

Johansen (Gudrun). **Monilinia fructigena (Aderh. & Ruhl.) Honey i Danmark.** [*Monilinia fructigena* (Aderh. & Ruhl.) Honey in Denmark.]—*Friesia*, iii, 2, pp. 111–114, 3 figs., 1945. [English summary.]

The author records the finding in Denmark of apothecia of *Monilinia* [*Sclerotinia*] *fructigena* [*R.A.M.*, xiv, p. 703] on mummified apples, which had been stored in the soil on 9th September, 1936, and remained for twenty months buried. On 18th May, 1938, mature and immature apothecia were found on one mummified apple and during the rest of May and the beginning of June apothecia were discovered on five more, in clusters of from two to eleven. The stalk was ½ to 1 cm. in length, the disk at first cup-, later funnel-shaped, yellow- to grey-brown, 2·5 to 7 mm. in diameter. The asci were cylindrical, 115 to 170 by 7·5 to 11 (average 156 by 10) μ, the paraphyses about 2 μ in width and rather longer than the asci. The ascospores were hyaline, unicellular, ellipsoid, pointed at the ends, 11·0 to 13·2 by 5·7 to 7 (12·2 by 6·5) μ. Apples inoculated with nine different mono-ascospore cultures developed pustules of conidiophores and conidia, the latter measuring on an average 15 to

22·9 by 8·6 to 14 (19·6 by 11·8) μ. Inoculation of young shoots resulted in the formation of cankers. It is considered that the apothecial characters are essentially concordant with those recorded by Aderhold and Ruhland for *S. fructigena*.

Zeller (S. M.) & Milbraith (J. A.). **Transmission of Peach wart to sweet Cherry.** —*Phytopathology*, xxxv, 8, pp. 607–609, 2 figs., 1945.

Peach wart [*R.A.M.*, xxii, p. 213; xxiii, p. 391] was transmitted by budding from Improved Elberta trees in western Oregon to seven peach varieties, namely, Early Crawford, Early Muir, J. H. Hale, Improved Elberta, Orange Cling, Rio Oso Gem, and Rochester, and three of sweet cherry, Napoleon (Royal Anne), Lambert, and Black Republican, five of each being used in all cases except the two last-named, represented by three each. Stem reactions in the Napoleon cherry consist in necrosis of the vascular ring as far as 12 to 15 in. back from the tip, resulting in a general die-back; sometimes excessive branching; shortening and enlargement of the internodes along the last few inches near the branch terminals, which thus acquire a rosetted appearance; and a tendency to reduction in leaf size as a consequence of crowding in the rosettes. The other two cherry varieties responded in a similar manner as regards the stems, but foliar mottling was most conspicuous in Napoleon, reaching a climax in May and June, when ring-like patterns or rectangular bands or lines develop on either side of the veins, and disappearing by late August. The peach-wart virus was also transmitted from the cherry trees back to peach with no apparent attenuation in the former.

Schneider (H.). **Anatomy of buckskin-diseased Peach and Cherry.**—*Phytopathology*, xxxv, 8, pp. 610–635, 10 figs., 1945.

Sieve-tube necrosis was found to be a feature of peach trees affected by buckskin [peach X-disease virus] in California [*R.A.M.*, xxi, p. 83]. The disorganized sieve-tubes contain wound gum, which gave a positive test with phloroglucinol and hydrochloric acid and reacted negatively or weakly with the Maule reagents for lignin. It was insoluble in a mixture of potassium chlorate and hydrochloric acid and in hot 10 per cent. nitric acid. After the removal of the wound gum by alternate chlorine water and sodium sulphite treatments, the sieve-tubes gave a positive test for cellulose, their previous response having been negative. In young peach shoots showing the early stages of necrotic spotting in the foliage, sieve-tube necrosis was confined to the visibly affected leaves and to the leaf traces below them. With the spread of the virus into the stem tips, necrosis set in also in the sieve-tubes of the youngest leaf primordia that had developed these elements. In the case of resumption of growth after invasion by the virus, the new sieve-tubes usually failed to undergo turgor expansion, lacked thick, crenulated walls with a pearly lustre, and early became necrotic.

Certain strains of the X-disease virus, e.g., one collected in an orchard at Merced, induced stem cankers on very susceptible varieties, such as Phillips Cling. Gum pockets were present in the cortex and phloem of the cankered areas, which were isolated by periderms and sometimes also in the unlignified new xylem. Swollen leaf veins in an infected Muir seedling peach produced an abnormal quantity of secondary phloem, the sieve-tubes of which, as well as those of the primary phloem, soon developed necrosis. Similar effects were induced by ringing of the stem in a Phillips Cling peach tree, and were likewise observed in Palora scions on myrobalan (*Prunus cerasifera*) [*P. divaricata*] rootstocks.

In uninfected young Napoleon sweet cherry trees grown in pots on Mahaleb [*P. mahaleb*] stocks, occasional sieve-tubes on the outer margin of the current year's summer phloem and the non-functioning of previous seasons sometimes contained wound gum, which was also frequently formed in the summer phloem of healthy orchard trees during the autumn. At this period the *P. mahaleb* sieve-tubes were

observed to form callus before those of the sweet cherry. Wound gum was more abundant in the healthy sweet cherry tops than in the *P. mahaleb* stocks, whereas in the case of X-virus-infected trees the position was reversed. In infected cherry scions on *P. mahaleb* stocks wound gum production in the summer phloem was very extensive even at midsummer: eventually the youngest sieve-tubes in the stock, just below the bud union, also became involved. No phloem injury was detected in either healthy or diseased orchard Napoleon cherries on Mazzard [*P. cerasus*] roots, but some wound gum was present in the outer phloem in infected young greenhouse trees on the same stock.

Morris (H. E.) & Afanasiev (M. M.). **Yellows, a non-infectious disease of the Progressive Everbearing Strawberry in Montana.**—*Bull. Mont. agric. Exp. Sta.* 424, 11 pp., 1944.

The non-infectious yellows disease of the Progressive strawberry, which causes a yellow appearance, dwarfing, lower yields, and shorter life, has been the subject of experiments at the Montana Agricultural Experiment Station. The results obtained show that the disease is transmitted through seed, while grafting of healthy Marshall and Blackmore plants on to diseased Progressive plants did not lead to the development of yellows, thus confirming the experience of Berkeley [*R.A.M.*, xi, p. 252], Guba [ibid., xiii, p. 40], Plakidas [ibid., xi, p. 463], and Demaree and Darrow [ibid., xvii, p. 402]. It is concluded that yellows is genetic in character. The use of the 'Montana Progressive' strawberry, produced at the Station, is the only known method of avoiding loss from yellows in the Progressive type of strawberry.

Gilles (E.). **Effet léthal des ondes très courtes sur les microorganismes. Les effets fongicide et bactéricide des ondes très courtes sont, dans certaines conditions, la conséquence d'une action thermique élective.** [The lethal effect of very short waves on micro-organisms. The fungicidal and bactericidal effects of very short waves are, under certain conditions, the consequence of an elective thermal action.]—*C.R. Soc. Biol., Paris*, cxxxviii, 15–16, pp. 545–546, 565–567, 1944.

Details are given of experiments, in progress since 1938, in the exposure of spore suspensions of yeasts and moulds, e.g., *Penicillium*, *Sterigmatocystis* [*Aspergillus*], and *Rhizopus*, in a medium of tap water, to very short waves (1·25 or 1·40 m.), the influence of which proved to be lethal within a very brief period, often of only a few minutes. Important factors in the successful outcome of the tests were a heavy spore concentration and the maintenance of the medium at a high temperature (40° C.), without which sterilization cannot be effected even by lengthy exposures.

Andrade (A. C.). **Ensáio de pulverizadores de costa.** [Appraisal of knapsack sprayers.]—*Biológico*, xi, 8, pp. 201–221, 2 pls., 6 figs., 1 diag., 1 graph, 1945.

A tabulated survey is given of the writer's investigation of the comparative merits for the disinfection of plants of low stature, notably cotton, potatoes, and kitchen-garden crops, in São Paulo, Brazil, of five different types of knapsack sprayers designated by the letters A to E. The factors to be considered in an adjudication between several appliances of this description include pressure, nozzle orifice dimensions and pump capacity, agitation, and efficiency of operation in the field. A pressure of 75 lb. was found to produce a good 'mist' and is to be generally recommended, though it was successfully raised to 100 lb. in a number of tests with sprayer D. The nozzle orifice ($\frac{5}{64}$ in.) and pump (9 mm. in diameter and 7 mm. in height) were also satisfactory. None of the machines could be regarded as perfect, but by a judicious combination of their best features a superior apparatus could be manufactured.

Horsfall (J. G.) & Barratt (R. W.). **An improved grading system for measuring plant diseases.**—Abs. in *Phytopathology*, xxxv, 8, p. 655, 1945.

According to the Weber-Fechner law differentiation by the human eye is regulated by the logarithm of light intensity. Hence, a grading system for the measurement of plant diseases should be based on equal ability to distinguish rather than, as heretofore, on equal amounts of infection. Below 50 per cent. the eye sees the area of diseased tissue; above that point, the healthy tissue stands out. The new rating method is therefore based on 50 per cent. as a mid-point, the grades differing by a factor of two in either direction as follows: 1 = 0, 2 = 0 to 3, 3 = 3 to 6, 4 = 6 to 12, 5 = 12 to 25, 6 = 25 to 50, 7 = 50 to 75, 8 = 75 to 87, 9 = 87 to 94, 10 = 94 to 97, 11 = 97 to 100, 12 = 100. Several plants (20 or more) are graded at random, and the mean grade equals the grade readings divided by the number of readings. A calibration curve is set up with grade numbers on the X-axis and percentage disease on a special semi-logarithmic Y-axis with one and one-half phases from either end up to 50 per cent. The system has already proved useful in research on fungicides, varietal reaction, and the like, and should be of value in plant-disease surveys.

Guba (E. F.) & Seeler (E. V.). **Studies on the identity and control of stilbaceous mold in gas-purifying sponge.**—Abs. in *Phytopathology*, xxxv, 8, p. 655, 1945.

This paper has already been noticed from another source [*R.A.M.*, xxiv, p. 109].

Krassilnikov (N. A.) & Korenyako (A. I.). Мицетин и его Бактерицидные Свойства. [Mycetin and its bactericidal properties.] *Микробиология* [*Microbiology*], xiv, 2, pp. 80–85, 1945. [English summary.]

A preparation of mycelium derived from *Actinomyces violaceus* [*R.A.M.*, xxii, p. 393] was found to be bactericidal to Gram-positive organisms only and to be more active in synthetic media containing no protein, and less so in meat media. Different strains of staphylococci, streptococci, and mycobacteria are highly susceptible while other strains of the same species may be highly resistant to its action. In mixed cultures the presence of some bacteria appears to protect other, susceptible, organisms from the effect of mycetin.

Ramon (G.) & Richou (R.). **Sur la culture des champignons inférieurs et en particulier du Penicillium notatum sur des milieux formolés.** [On the culture of the lower fungi, and in particular of *Penicillium notatum*, on formolized media.]—*C.R. Acad. Sci., Paris*, ccxx, pp. 265–267, 1945.

The addition to cultures of *Penicillium notatum* on a Czapek-Dox medium of formaldehyde at a dosage of 0·03 to 0·05 per 100 c.c. did not interfere in the least with the vegetative development or spore germination of the mould. Hence, it is suggested that formaldehyde, which is an excellent bactericide but at low concentrations does not inhibit mould growth (as was shown in a series of experiments by the authors over a period of years), may prove valuable as a preventive of extraneous contamination in the industrial production of penicillin.

Gots (J. S.). **The detection of penicillinase-producing properties of micro-organisms.** *Science*, N.S., cii, 2647, p. 309, 1945.

A simple method for rapidly determining the ability of an organism to produce penicillinase is described. To 10 c.c. melted tryptose-phosphate agar at 45° C. 0·1 c.c of a 24-hour broth culture of a strain of *Staphylococcus aureus* sensitive to penicillin is added. Penicillin solution is then added to give final concentrations of 0·5 units per c.c. The plates are poured and allowed to harden at room temperature,

a minimum of surface moisture being necessary. The organism to be studied is then introduced by a single streak, the plates being incubated at 37° for 24 to 48 hours, and inspected for satellite *S.* colonies. If the streaked organism does not produce penicillinase, satellite *S.* colonies do not develop, but if it does produce sufficient penicillinase, then satellite colonies of *S.* occur round the line of the streaked organism. The width of the zone of satellite colonies depends on the amount of penicillinase produced and the concentration of the penicillin in the agar.

Brock (M. C.). **Solvent solutions best for mildew-proofing thread.**—*Text. World*, xcv, 4, p. 141, 1 fig., 1945.

The most effective control of mildew in thread has been obtained by treatment of the warp or skein with copper naphthenate in Stoddard solvent [*R.A.M.*, xxiii, pp. 265, 266; xxiv, p. 200, *et passim*]. Specification JQD 596 (Jefferson Quartermaster Depot), consisting of 8 parts 8 per cent. copper naphthenate to 5 parts spindle oil in a suitable solvent, gives excellent flexibility. Where colour is important, zinc naphthenate may be preferable to copper, which imparts a green colour to the material. A successful method of applying the mildew-proofing agent is to mix it with fibrin wax and run the thread over a hot roll revolving in a wax tank.

Klemme (Dorothea), Greathouse (G. A.), Bollenbacher (Katharina), & Pope (S.). **The deterioration of Cotton fabric by certain micro-organisms.**—*Circ. U.S. Dep. Agric.* 737, 10 pp., 2 figs., 3 graphs, 1945.

Out of 43 fungal isolates studied for their capacity to cause loss of breaking strength in an 8-oz. bleached cotton duck fabric after a week's incubation on a liquid mineral-salt medium with ammonium nitrate as a nitrogen source, 24 were responsible for over 50 per cent. tendering [*R.A.M.*, xxiv, p. 428]. The heaviest reductions were caused by three strains of *Metarrhizium glutinosum* (97, 94, and 84 per cent.), *Stachybotrys atra* (88), *Chaetomium globosum* (86), *Trichoderma* sp. (86), *Thielavia terricola* (81), *Cephalosporium* sp. (81), and *Fusarium oxysporum* (73). The one bacterium, *Spirochaeta cytophaga*, included for comparative purposes, decreased the strength of the fabric by 76 per cent. on the same medium.

Chaetomium globosum, 12 isolates of *Fusarium*, the above-mentioned three of *M. glutinosum*, and *S. cytophaga* were also grown on mineral salts media containing (1) sodium nitrate and (2) ammonium dihydrogen phosphate as nitrogen sources, while a species of *Hormodendrum* was cultured on the former only. In general, the *F.* isolates brought about the maximum amount of deterioration on the ammonium phosphate substratum and the minimum on the sodium nitrate, while those of the other genera and the bacterium were most destructive on the ammonium nitrate nutrient. *C. globosum*, however, proved to be an exception in this respect, causing the most extensive loss on the sodium nitrate medium.

The results of the study indicate a specific relationship between the nutritive reactions of the majority of the organisms utilized and their ability to tender fabrics, within which limitations they are adaptable for experimentation.

Appling (J. W.) & McCoy (J. F.). **Relative toxicity of disinfectants recommended for use in the paper industry. II. Inhibiting concentrations for Bacillus mycoides and Aspergillus niger.**—*Paper Tr. J.*, Tech. Sect., cxxi, 3, pp. 37–40, 1945.

The following were the inhibiting concentrations of ten disinfectants tested against *Aspergillus niger*, an agent of mould in paper and pulp [*R.A.M.*, xxii, pp. 121, 414] in malt agar cultures in Petri dishes after a week's incubation at 30° C. at the Institute of Paper Chemistry, Appleton, Wisconsin: lignasan, 0·0006 to 0·0008 per cent.; merfenel, 0·0001; nalco 21, 0·0120; nalco 21 B, 0·0040; nalco 21 M, 0·0018 to 0·0020; nalco 23, 0·0018 to 0·0020; penetox, 0·0400; permatox 1-S

[cf. ibid., xxiii, p. 507], 0·0016 to 0·0018; P.M. 32 powder, 0·0016; and santobrite [ibid., xxiv, p. 394], 0·0016. The cost toxicity data (inhibiting concentration in p.p.m. × average price per lb. in $) for the several preparations are tabulated as follows: lignasan 2·88, merfenel 11·20, nalco 21 15·60, nalco 21 B 6·60, nalco 21 M 3·42, nalco 23 3·30, penetox 80·00, permatox 1-S 8·00, P.M. 32 powder 12·80, and santobrite 2·40.

Vanderwalle (R.). **Observations sur l'action de la colchicine et autres substances mito-inhibitrices sur quelques champignons phytopathogènes.** [Observations on the action of colchicin and other mito-inhibiting substances on some phytopathogenic fungi.]—*Bull. Soc. Bot. Belg.*, lxxii, 1, pp. 63–67, 2 figs., 1939. [Received October, 1945.]

Studies on the effect of colchicin, phenylurethane, and acenaphthene on various phytopathogenic fungi [cf. *R.A.M.*, xx, p. 548] are described. From experiments on *Botrytis cinerea*, *Diaporthe perniciosa*, and *Verticillium dahliae* it is concluded that the effect of colchicin (0·2 per cent.) is much less marked on fungi than on higher plants, the concentration necessary to produce the first sign of any action on fungi being at least ten times as great as that required to produce an effect on higher plants. On fungi colchicin appears merely to exercise a toxic effect or to inhibit growth. In tests with etherized solutions of phenylurethane and acenaphthene at 10 per cent. concentration, the former arrested all mycelial development and the latter strongly retarded the germination of *B. cinerea*, which after a few weeks' growth ceased completely. When *Graphium* [*Ceratostomella*] *ulmi* was similarly treated with acenaphthene, conidial germination was rapid, but subsequent development retarded, and the mycelium was thicker than in the control.

Morris (H. E.) & Afanasiev (M. M.). **Potato diseases in Montana and their control.** *Circ. Mont. agric. Exp. Sta.* 166, 41 pp., 21 figs., 1942. [Received November, 1945.]

This circular deals with the etiology of potato diseases in Montana, seed selection, crop rotation, seed treatment, disinfectants for cutting-knives, sacks, canvas, etc., suberization, storage, potato seed plots, and the various diseases of the potato plant throughout the 35,000 acres planted annually with this crop in the State.

McKay (R.) & Clinch (P[hyllis] E. M.). **Frost injury simulating virus disease symptoms on Potato foliage.**—*Nature, Lond.*, clvi, 3963, pp. 449–450, 1945.

Following investigations made in Northern Ireland during 1944 and 1945, the authors draw attention to the possibility that widespread mottling of potatoes may not, as the symptoms suggest, be due to mosaic virus disease [*R.A.M.*, vi, p. 634], but to the effect of low temperatures on plants at a stage of development which renders them susceptible to injury; and they submit that, while much of the evidence available is of a circumstantial character, representatives of plants attacked by mottling should be scientifically tested before condemning the stock. The senior author describes strong mottling of Up-to-Date, Kerr's Pink, and Arran Chief potatoes, grown for seed on low-lying, peaty soil in Donegal in 1929 and plainly discernible ten days after a sharp frost on 7th July. The previous history of the crop and the manner in which the mottling developed showed the effect to be due entirely to frost; and the same cause appears assignable to similar symptoms observed on potatoes in Southern and Northern Ireland in July, 1944, after night temperatures of 32° to 35° F. had been registered in Dublin during the last week in June and one or more degrees of frost in the north. An examination of plants grown from these Arran Pilot tubers showed no disease symptoms, and the only virus isolated was a very mild strain of virus X. Following a severe frost on 26th March, 1945, a small shoot of a President plant in a cold greenhouse devoted to the

development of virus-free potatoes at Albert Agricultural College, showed light and green mottling of the leaves, symptoms characteristic of a non-necrotic strain of virus X, but tests showed no virus infection. As the rest of the plant failed to show any disease symptoms up to the time of maturity, the conclusion was drawn that the mottling was caused by low temperatures operating at a critical period of growth, and also in this case by reason of the location of the tip of the affected shoot close to the soil or rim of the pot at that time.

Benza (J. C.). **Resultados de la experimentación sobre el cultivo de la Papa.** [Results of experimentation on Potato cultivation.]—*Circ. Estac. exp. agríc., Lima*, 62, 89 pp., 1944.

The following information of phytopathological interest occurs in this account of experiments to determine the best methods of potato cultivation in Peru. The virus diseases, mild mosaic [potato virus X], spindle tuber, leaf roll, and rugose mosaic [potato virus Y, frequently in association with potato virus X], are estimated to attack 25 per cent. of the Rímac Valley crops, with a resultant drop in yield of 20 per cent. (or 4,000 kg. per ha.). Fungal diseases in the same area, notably late blight (*Phytophthora infestans*) and wilt (*Fusarium oxysporum* and *F.* [*solani var.*] *eumartii*), are responsible for a 10 per cent. reduction. Seed treatment with formalin (two hours' immersion in a solution of 4 l. in 1,000) is recommended against *Spongospora subterranea* and *Rhizoctonia* [*Corticium*] *solani*, the latter method being also partially effective in the control of rot-producing *Fusarium* spp., but not of the wilt agents. Among the factors contributing to the poor yields of potatoes in Peru are the wide diffusion of diseases and pests, both at high and low altitudes, the absence of protective measures, and inadequate cultural methods.

Bald (J. G.). **The effect of rugose mosaic on the yield of Potatoes.**—*Phytopathology*, xxxv, 8, pp. 585–590, 1 graph, 1945.

In two experiments at Canberra, A.C.T., Australia, leaf areas were measured on Early Carman potato plants infected by rugose mosaic, caused by viruses X and Y [cf. *R.A.M.*, xxiii, pp. 73, 144, 496], and on 'normal' ones harbouring virus X, the final yields also being estimated in both cases. The yield reduction due to virus Y was proportional to the diminution in leaf area measured over a 30-day period after the initiation of tuber formation. The yield of tubers weighing over 2 oz. was reduced by Y infection more than the total output, since the decline in the number of tubers was proportionately less than that of foliar area. For example, in group A in the 1941–2 test, the numbers and weights of tubers below 2 oz. from five rugose mosaic-diseased and ten 'normal' plants were 2·2 and 64 gm. and 1·9 and 72 gm., respectively, the corresponding figures for those above 2 oz. being 1·6 and 115 gm. and 3·1 and 265 gm., respectively, and for the yield per sq. dm. of leaf area 8·8 and 8·7 gm., respectively. In 1942–3 there was again no demonstrable difference in the yield per sq. dm. of leaf area of six 'normal' and two rugose mosaic-diseased plants.

Bald (J. G.) & Norris (D. O.). **Virus C from an old Australian variety of Potato.**—*Phytopathology*, xxxv, 8, pp. 591–597, 1 fig., 1945.

A virus isolated from an old Australian potato variety, Brown's River, was identified as virus C [*R.A.M.*, xxiii, p. 404], the physical properties and host range of which ally it closely to virus Y, though it is not ordinarily transmissible by the most efficient vector of the latter virus, *Myzus persicae*. Virus C was inoculated by mechanical means or grafting into 11 other potato varieties, the reactions of which are shown in tabular form. Of the four other Solanaceae inoculated, *Nicotiana glutinosa* gave the most characteristic responses, which included vein-clearing, upward ballooning of the interveinal areas, veinbanding, and loss of colour in the interveinal zones, resulting in mottling, stunting, and severe distortion of the

younger leaves. Similar but milder symptoms were induced by virus Y on *N. glutinosa*, while on Hickory Pryor tobacco the effects of C and Y were almost indistinguishable. *Datura stramonium* reacted negatively to infection by virus C, and on [chilli] pepper the faint mottling, sometimes outlined in pale bronze and accompanied by upward rolling and chlorosis of the leaves, developed only after an incubation period of five weeks. The dilution end point of virus C was between 1 in 10,000 and 1 in 100,000, the thermal death point 61° C., and the period of resistance to ageing *in vitro* between 10 or 11 and 16 days. It is thought unlikely that the virus will spread or cause serious losses.

Potato blights now controllable.—*Food Packer*, xxvi, 7, pp. 68, 70, 1 fig., 1945.

Dithane (disodium ethylene bisdithiocarbamate) [*R.A.M.*, xxiv, p. 195] was first made available commercially by Rohm & Haas, Philadelphia, in the autumn of 1944, and its large-scale use for the control of potato early and late blights [*Alternaria solani* and *Phytophthora infestans*] has hitherto been confined to certain southern regions of the United States. Thus, in the Homestead region of Florida, fields treated with dithane D. 14 yielded as much as 325 to 425 bush. per acre compared with 225 to 275 for those given Bordeaux or other coppers. The value of continuing the treatments until maturity was experimentally demonstrated, an increase of 22·8 bush. per acre, representing a net profit to the grower of $45.56, having been obtained in one trial from an additional (eighth) weekly application. These results were confirmed by the experience of commercial growers, who reported yields of 425 bush. per acre from nine or ten applications as against 350 for seven.

The combination of water-solubility and surface activity in dithane causes the formation of an invisible, unbroken film over the foliage. Unlike the insoluble coppers, the new preparation undergoes no loss of strength through settling out of suspension in the spray tank, nor does it clog the nozzles of the equipment.

Bertrand (H. W. R.). **Treatment of brown bast.** *Quart. Circ. Ceylon Rubb. Res. Scheme*, xxii, 1–2, pp. 21–22, 1945.

Neither scraping nor stripping of old *Hevea* rubber trees having given satisfactory control of brown bast [*R.A.M.*, xix, p. 165; xxiii, p. 290], the author (for whose views the Rubber Research Board accepts no authority) considered that owing to the more rapid bark renewal of young trees a less drastic method might be better. A new procedure was therefore tested on budded rubber of Tj. 1 and HC. 28 of six to eight years. The panel was isolated by cutting the usual groove through the hard bast and a cut was made in the wood with a sharp, narrow blade. The affected area was lightly scraped, the knife never being allowed to pass into the soft bast. The large but thin traces of brown bast tissue were disinfected next day with 5 per cent. izal and Swedish Red, the whole work being done in fairly dry weather.

The results showed that on one estate of 52 trees treated 13 were cured by one treatment, 32 of the remaining 39 being cured by a second treatment six months later. On a second estate, of 44 trees treated, 34 were cured the first time. The method appears to be economical and effective and also to require less skill than the old, deeper method.

Campbell (W. A.) & Sleeth (B.). **A root rot of Guayule caused by Pythium ultimum.**—*Phytopathology*, xxxv, 8, pp. 636–639, 1 fig., 1945.

Guayule (*Parthenium argentatum*) in California suffers from a root rot due to *Pythium ultimum* [*R.A.M.*, xxiv, p. 287], which falls into two stages, one known as 'seedling root rot' on plants in the cotyledonary phase (a period extending over about four weeks), and the other, termed 'pink rot', affecting those from six weeks to four months old. The former, characterized by slight stunting and a purplish or reddish discoloration of the cotyledons and rotting of the roots at varying depths

in the soil, may be regarded as part of the damping-off complex, while the latter causes the formation of pink lesions, $\frac{1}{8}$ to $\frac{1}{2}$ in. long, on the tap-roots, generally 3 to 6 in. below soil-level. This form of root rot, which is accompanied by wilting of the tops during the heat of the day, may be responsible for severe losses on heavy, poorly drained soil.

Of the 51 isolates studied, 27 produced oospores typical of *P. ultimum* as described by Middleton [ibid., xxii, p. 373] on maize meal agar, while the remaining 24, which formed only sporangia or similar structures, were referred to the same species on the grounds of association with oospore-producing isolates, morphological aspect, and growth rates.

CHOWDHURY (S.). **Diseases of Pan (Piper betle) in Sylhet, Assam. Part V. Sclerotial wilt. Part VI. Gloeosporium leaf-spot.**—*Proc. Indian Acad. Sci.*, Sect. B, xxii, 3, pp. 175–190, 2 pl., 2 graphs, 1945.

Sclerotium rolfsii has been found to cause an annual mortality of 4 to 31 per cent. in the *Piper betle* [*R.A.M.*, xiv, p. 122] plantations of a number of Assam villages [cf. ibid., xxiv, p. 248]. The symptoms induced by the pathogen comprise decay of the stem at soil-level, where a dense, white, cottony mycelial mass is found at the site of entry, and wilting of the aerial organs. Numerous sclerotia develop on the stems and on the soil near the plant bases, while inter- and intracellular hyphae penetrate the tissues and disorganize the middle lamella, where a soft rot consequently develops. The disease appears during the middle or latter part of May and continues to flourish until the first or second week in August, when the incidence of infection begins to decline and the attacks cease in early September.

Inoculation experiments in which the sclerotia were buried 3 or more inches deep in the soil gave negative results, but rapid infection ensued when they were placed on, or an inch below, the surface; at a depth of 2 in. the symptoms were delayed. The incubation period ranged from two to five days, and a high degree of humidity was shown to be essential for infection, while the virulence of the fungus reached a climax at 30° to 35° C. These data are borne out by field observations, which have shown the prevailing temperatures during June and July to approximate to this range and to be accompanied by a relative humidity of 91 to 98 per cent.

In oatmeal agar cultures the mycelium of *S. rolfsii* was killed by three minutes' exposure at 50° and two at 52°, while the sclerotia succumbed after five minutes at 59° and two at 62°. In the laboratory the sclerotia retained their viability for a year, but after 16 months all were dead. In the field they may be buried to a depth of 4 in. in fairly moist soil with little loss of viability, but at 6 in. none was capable of germination after 45 days.

In nature wilt is disseminated by the sclerotia, which are carried on implements, the feet of labourers and animals, drainage water, manure, and soil. Earthing-up the soil in such a way as to cover the sclerotia with a layer over 3 in. deep reduced the mortality from *S. rolfsii* from between 12 and 21 to between 2 and 7 per cent. Prevention of the disease should be based on soil sterilization, preferably by heat, the planting exclusively of healthy setts, and deep ploughing. The heating of the soil may be carried out with a gun emitting a flame of 2,000° F., bringing the temperature to 75° to 82° C. for a depth of 6 in., or failing this contrivance by burning with straw, thatching grass, or some similar material.

A widespread leaf spot of *P. betle*, characterized by irregular, straw-coloured, depressed lesions, usually one to four, rarely covering the surface, was found to be caused by a species of *Gloeosporium* [ibid., xxiii, p. 457] representing the conidial state of *Glomerella cingulata*. The disease, which is of no great importance, is spread by wind and rain, and persists on dead vines and foliage lying in the plantations. It may be combated by clean cultivation, destruction of dead refuse, and spraying the plants with 2–2–50 Bordeaux mixture or perenox.

HEIM (R.). **Un Agaric rhizomorphique parasite des semis de Quinquina en Haute-Guinée.** [A rhizomorphic Agaric parasitic on the seedlings of *Cinchona* in Upper Guinea.]—*Rev. Bot. appl.*, xx, 222, pp. 78–87, 2 figs., 1940. [Received September, 1945.]

In April, 1939, the author observed *Cinchona succirubra* and *C. ledgeriana* seedlings in a nursery in Upper Guinea apparently affected by a form of damping-off. The plants wilted and parts of them died when the two first leaves were 4 to 5 mm. long; the affected parts showed the presence of a small agaric, which was evidently responsible for the condition. This fungus produced whitish rhizomorphs, which spread through the soil of the infected beds, and, on approaching roots, gave off hyphae which penetrated into the superficial and deeper tissues of the plants.

The sporophores showed an excessive development of the stipe, which was dirty white, measured up to 22 mm. in height, and lengthened out into a pointed cone up to 3 (occasionally 4) mm. in diameter at the base and 0·7 mm. at the apex. The stipes generally terminated in a pileus which appeared triangular in profile and measured less than 3 (exceptionally 4) mm. in diameter. Under the markedly involuted, dark greyish-blue peridium were about 24 pliciform, strongly decurrent, whitish lamellae which constituted the sterile hymenium. The flesh was whitish and odourless, and continuous from the stipe to the pileus.

From the base of the sporophores, usually isolated, but sometimes connate in twos and threes, spread milky-white, branched rhizomorphs ranging up to 250 μ in diameter and forming a network, with sporophores at the nodes.

The parallel, cylindraceous constituent hyphae of the rhizomorphs measured 3 to 15 μ in diameter, while the thin, sinuous, nodulous, varicose, irregular supporting hyphae measured mostly 2 to 3 μ in diameter. The young hymenium showed basidial, piriform-elongated cells 6 μ broad, without sterigmata or any beginning of sporulation. The fungus was evidently a purely vegetative form, and was unable to develop further. It appeared to belong to *Clitocybe*, and does not seem to have been recorded before.

The control measures recommended consist in the careful removal with forceps of the fungi and rhizomorphs from the frames as soon as they appear, the aeration of the frames, and the partial sterilization of the soil before sowing by means of natural or steam heat, or by the application of 2 to 4 per cent. formaldehyde solution or of ortho–2–4–dinitrophenol.

STOFFELS (E. H. J.). **Le Quinquina.** [Cinchona.]—*Publ. Inst. nat. Étude agron. Congo belge, Sér. tech.* 24 a, 57 pp., 26 figs., 1 graph, 1945.

In the section of this publication (which is a second and larger edition of one originally issued in 1939) dealing with fungal diseases of *Cinchona* (pp. 24–25), very brief notes are given on the root diseases due to *Armillaria mellea* [*R.A.M.*, xxiii, p. 431], *Rosellinia arcuata*, *Diplodia* [*Botryodiplodia*: loc. cit.] *theobromae*, and *Helicobasidium* sp. [loc. cit.]; trunk and branch infection by *Corticium salmonicolor* [ibid., xix, p. 330]; trunk infection by *Phytophthora palmivora*; the disease formerly referred to as a tracheomycosis [loc. cit.; ibid., xxiii, p. 431], but now found to cause bark necrosis also; leaf infection by *Phyllostictina* sp., seedling damping-off due to *Rhizoctonia* sp. [loc. cit.], and seedling root disease caused by *Cladosporium herbarum*. [It is not stated whether all these diseases occur in the Belgian Congo or not.]

MCM[ARTIN] (A.). **Fungicide experiments on Cane planted under wet conditions.**—*S. Afr. Sug. J.*, xxix, 7, p. 279, 1945.

Before planting in excessively moist soil on 25th January, 1945, the ends of Co. 281 sugar-cane cuttings were dipped in the following fungicidal solutions as a precaution against pineapple disease [*Ceratostomella paradoxa*: *R.A.M.*, xxiv, p. 290]: abavit, ceresan, and agrosan at 1 and 2 per cent., harvesan [ibid., xxiv,

p. 177] at 2 and 4 per cent., and spergon at 6·5, 1·25, and 2·5 per cent. Each plot consisted of 50 four-budded cuttings, and each treatment was replicated six times. On 10th April, when the final counts were made, the number of buds grown out of 1,200 in the plot treated with 1 per cent. abavit was 601 compared with 331 in the control, the increases secured from the remaining treatments ranging from 349 (minimum concentration of spergon) to 556 (2 per cent. agrosan). An examination of the cuttings on 17th April revealed very little pineapple disease, most of the decay being of a general nature in which no single organism predominated. All the treatments, especially the mercurials, gave some degree of control, but abavit 1 per cent. again excelled all the rest, with a total number of shoots amounting to 3,483 compared with 773 in the check plot.

MAYOR (E.). **Contribution à l'étude de la flore mycologique du Valais. La flore mycologique de Val d'Anniviers.** [A contribution to the mycoflora of Valais. The mycoflora of the Val d'Anniviers.]—*Bull. Murith.*, lx, pp. 73–90, 1942–3. [Received November, 1945.]

A list is given, based on a study of the relevant literature and on numerous personal observations made in 1941 and 1942, of the parasitic fungi present in the Val d'Anniviers, canton of Valais, Switzerland. The list comprises Peronosporaceae, Protomycetaceae, Exoascaceae, Erysiphaceae, Ustilaginales, and Uredinales.

MAYOR (E.). **Mélanges mycologiques.** [Miscellaneous mycological notes.]—Reprinted from *Ber. schweiz. bot. Ges.*, liv, 18 pp., 1944. [Received November, 1945.]

Notes are given on the author's investigations in Switzerland into *Milesia kriegeriana* [*R.A.M.*, xv, p. 469], *M. scolopendrii* [ibid., xxi, p. 455], *M. vogesiaca* [ibid., xx, p. 235], *M. polypodii* [ibid., xv, p. 469], *Uromyces poae* Rabh. f. sp. *repentis-trivialis* Juel, *Puccinia baryi*, and *P. ribesii-diversicoloris* [ibid., xix, p. 119].

In the canton of Neuchâtel the pycnidia and aecidia of *M. kriegeriana* form on the current year's needles of *Abies alba*, and never develop on those two years old or more, while the same applies to all the other species of *Milesia* found locally. The aecidia of *M. kriegeriana* were present from 20th July up to 10th October. As in the case of aecidia of other species of *Milesia* present in the canton, they were noted only on young *Abies*, never on large trees, and the younger the trees, the more susceptible they are. Experimental evidence demonstrated that the pycnidia and aecidia of *M. kriegeriana* can develop on *A. alba*, *A. cephalonica*, *A. concolor*, *A. grandis*, *A. nordmanniana*, and *A. pinsapo*, but were observed in nature only on *A. alba*.

M. scolopendrii, found in different parts of Europe on *Phyllitis scolopendrium*, is rather rare in Switzerland, and has been seen by the author only in four places in the canton of Neuchâtel. Experimental evidence showed that the pycnidia and aecidia can develop on *A. alba*, *A. cephalonica*, *A. concolor*, *A. nordmanniana*, and *A. pinsapo*.

M. vogesiaca is found in Switzerland on *Dryopteris lobata* and very rarely *D. lonchitis*. Experimental infections showed that the pycnidia and aecidia can develop on *A. alba*, *A. cephalonica*, *A. nordmanniana*, and *A. pinsapo*.

The pycnidia and aecidia of *M. polypodii* were observed in nature locally only on *A. alba*, but in infection tests they also developed on *A. cephalonica*, *A. concolor*, *A. nordmanniana*, and *A. pinsapo*.

In 1932 and 1933 the author showed experimentally that the pycnidia and aecidia of *P. baryi* develop on barberry [ibid., xiii, p. 655]. In 1935 aecidia were observed at Chaumont-sur-Neuchâtel. From 1940 to 1942 the author observed in four localities aecidia on barberry which resembled those of this fungus. With these, he experimentally infected young seedlings of *Brachypodium silvaticum*, on which uredospores of *P. baryi* later developed.

Infection tests showed that the pycnidia and aecidia of *P. ribesii-diversicoloris* are able to develop on gooseberry, red currant, *Ribes alpinum*, *R. aureum*, *R. petraeum*, and *R. sanguineum*, but not, apparently, on black currant. In nature, so far as the author is aware, they occur only on *R. alpinum* and gooseberry; locally, they are common on the former and rare on the latter.

Mayor (E.). **Notes mycologiques. XI.** [Mycological notes. XI.]—Reprinted from *Bull. Soc. neuchâtel. Sci. nat.*, lxviii, 16 pp., 1943. [Received November, 1945.]

The following items are selected from this further instalment of the author's mycological studies from 1939 to 1942 in the canton of Neuchâtel, Switzerland [cf. *R.A.M.*, xx, p. 235]. *Plasmopara sphaerosperma* was found on the leaves of *Tragopogon pratensis* in 1933 and 1935. This fungus was previously reported by the author as *Bremia lactucae*, but Săvulescu has expressed the view [ibid., xxiii, p. 120] that the fungi recorded in the literature on *T. dubius* and *T. pratensis* as *B. lactucae* should be referred to *P. sphaerosperma*, a detailed description of which he gives. This fungus appears to be very rare, having been recorded in only two places (Rumania and Italy) on *T. dubius* and in two (Czechoslovakia and Switzerland) on *T. pratensis*. *Microsphaera alphitoides* [*M. quercina*: ibid., viii, p. 411 *et passim*] was found on the leaves of *Quercus robur* var. *pyramidalis* in 1942. *Coleosporium campanulae* [ibid., xxiii, p. 156] was collected on needles of *Pinus nigra* on 11th May, 1939, and early in May, 1940, 1941, and 1942. *Melampsora orchidirepentis* [*M. repentis*: ibid., xvi, p. 776] was found on several occasions on leaves of *Salix repens*.

Beeli (M.). **Notes mycologiques congolaises. Champignons récoltés dans la région du Kivu par F. L. Hendrickx, mycologue à l'Ineac.** [Mycological notes from the Congo. Fungi collected in the region of Kivu by F. L. Hendrickx, mycologist to Ineac.]—*Bull. Jard. bot. Brux.*, xvi, 1, pp. 105–107, 1940. [Received October, 1945.]

This annotated list of fungi collected in the vicinity of Kivu, Belgian Congo, by F. L. Hendrickx during 1938 and 1939 includes several Polyporaceae.

Da Camara (E. de S.) & Da Luz (C. G.). **Mycetes aliquot Lusitaniae. VI.** [Some fungi of Portugal. VI.]—*Agron. lusit.*, v, 2, pp. 119–142, 2 pl., 1943. [Received October, 1945.]

This further instalment of the writers' critically annotated list of fungi of Portugal [cf. *R.A.M.*, xxii, p. 409] comprises, besides three new and one doubtful species, 34 hitherto unknown in the country, including *Septoria apii* on celery and *S. saponariae* on *Saponaria officinalis*.

Buchwald (N. F.). **Lidt om Hymenoforets variation hos poresvampe og en ny varietet af Daedalea quercina (L.) Pers., D. quercina var. irpiciformis.** [On the variation of the hymenophores of Polyporaceae and a new variety of *Daedalea quercina* (L.) Pers.]—*Friesia*, ii, 2–3, pp. 161–165, 1 fig., 1940–1941. [English summary. Received November, 1945.]

This paper discusses briefly the variations of the hymenophore in Polyporaceae, which are either environmental or more frequently autogenous. A new variety of *Daedalea* [*R.A.M.*, xxiii, p. 158] is described as differing from the normal form in its irpicoidal hymenophore, with coriaceous, membranaceous, compressed teeth, with sharp apices, 5 to 15 mm. long; found on oak trunks in the Nørreskov woods of North Zealand on 7th October, 1934.

Baker (G[ladys] E.). **Conidium formation in species of Aspergilli.**—*Mycologia*, xxxvii, 5, pp. 582–600, 64 figs., 1945.

The writer points out that the conidia of *Aspergillus clavatus*, *A. fumigatus*, and *A. repens* are uninucleate and produced from uninucleate phialides; the conidium

of *A. fumigatus* becomes binucleate by mitotic division preceding germination; and that the conidia of the other two species become multinucleate by several mitotic divisions before germination and their spores at germination show great volumetric increase [cf. *R.A.M.*, xxiii, p. 494]. In these species the transfer of a single conidium is presumed to perpetuate a homokaryotic line, but mass spore transfers would enable the process of heterokaryosis to be effected by anastomoses, dependent upon differences existing in the haploid nuclei. It might be expected that heterokaryosis would be increased in the case of *A. repens*, owing to differences among the nuclei arising from karyogamy and meiotic segregation in a homothallic and perithecial species. The conidia of *A. echinulatus* are multinucleate when formed, but the original nuclei entering the conidia divide freely so that before germination the cell may have more than eight nuclei. Transfer of a single conidium may mean the carrying of different characters although there is an equal probability that all nuclei which enter the spore are alike. As *A. echinulatus* is homothallic and perithecial, the effects of karyogamy and meiotic segregation must be taken into account in relation to the nature of the haploid nuclei. Whether the several nuclei of the conidiophore initial cells are homo- or heterokaryotic cannot be determined cytologically, but depending upon this condition, conidia of different chains on the same vesicle may carry like or unlike nuclei.

The conidia of *A. repens* and *A. echinulatus* differ sharply in their nuclear condition, and if both species are good representatives of the *A. glaucus* group, the suggestion that the group as a whole differs cytologically from other *Aspergillus* spp. is untenable.

KRASSILNIKOV (N. A.). О классификации лучистых грибов ACTINOMYCETALES. [The classification of the ray-fungi, Actinomycetales.—*Микробиология* [Microbiology], xiv, 3, pp. 164–171, 1945. [English summary.]

The author claims that the Actinomycetales [*R.A.M.*, xxiii, p. 150] form a distinct group of organisms and include the genera *Proactinomyces*, *Mycobacterium*, *Corynebacterium*, and *Mycococcus*. Diagnostically the group, together with the non-sporing, Gram-positive rods and cocci, may be differentiated from the Gram-negative, and the sporulating, motile, Gram-positive bacteria, and is entitled to consideration as an independent taxonomic unit.

TUNSTALL (A. C.). **Mycological Branch Report for 1944.**—*Rep. Tocklai Exp. Sta. Indian Tea Ass., 1944*, pp. 5–7, [1945].

Sun scorch of young tea plants set out during the rains may be prevented by the protection of the collars from the August and September sun by a bamboo wrapping round the stems, while interplanting with *Boga medeloa* should also prove helpful.

An investigation of the mode of overwintering of the black-rot fungus (*Corticium invisum*) [*R.A.M.*, xv, p. 748; xxi, p. 48] in material collected at the Station, at Borbhetta, and in local gardens, revealed its presence on the branch surfaces from the current season's growth to varying distances between the last pruning-level and the soil, with a maximum of 20 in. The sclerotia, hyaline at first, turning darker later, and of variable shape, were minute, the maximum dimensions observed in November being 263 by 145 μ. They first became visible in the second week of September and did not extend beyond the primary cortex. By the middle of December the rather dark-coloured superficial mycelium connecting the elongated sclerotia was probably dead.

Good control of red rust [*Cephaleuros mycoidea*] was obtained in experiments from 1941 to 1944 by spraying with 0·3 per cent. perenox [ibid., xxi, p. 391], while the beneficial effects of one year's omission of pruning and of leaving an extra leaf above the plucking-level in July and August of each season were also noticeable.